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	62281632	06.11.1987
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	63233995	19.09.1988

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(54) Voice actuated dialing apparatus

(57) A voice actuated dialing apparatus has a feature extraction part 22 for extracting an input speech pattern, a storage part 25, 26 for storing registered standard patterns and corresponding telephone numbers of destination subscribers, a pattern matching part 24 for comparing an input speech (a standard) pattern with the registered standard patterns so as to recognize a predetermined one of the registered standard patterns which matches the input speech pattern, a speech synthesis part 23 for outputting a speech corresponding to the predetermined standard pattern read out from the storage for confirmation of a result of the recognition, and a dialing circuit 27 for dialing to a predetermined one of the registered telephone numbers corresponding to the predetermined standard pattern in a voice-dialing mode.

FIG.2

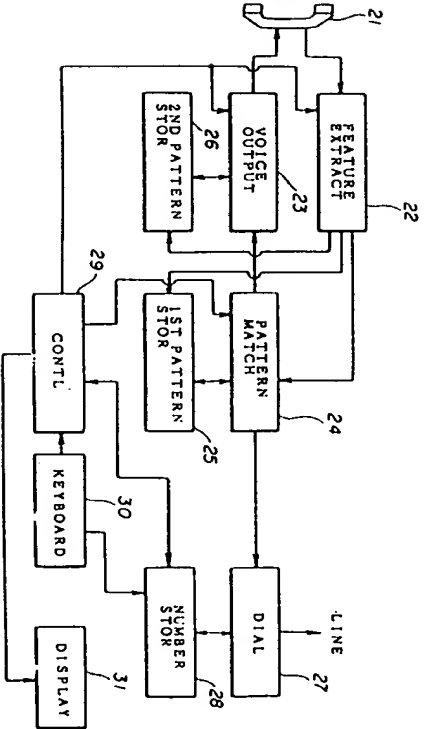


FIG. 12

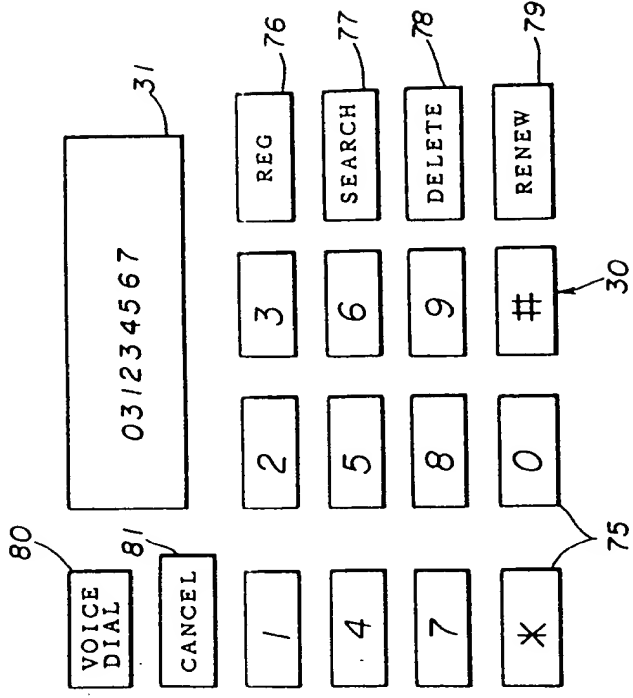


FIG. 1 (PRIOR ART)

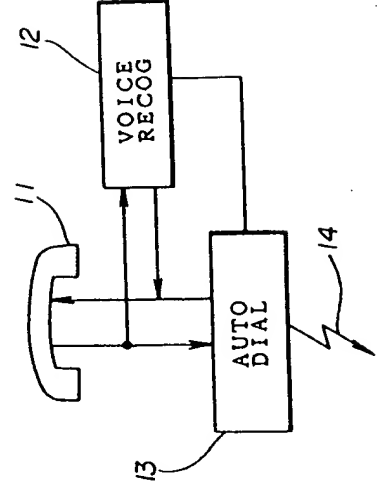
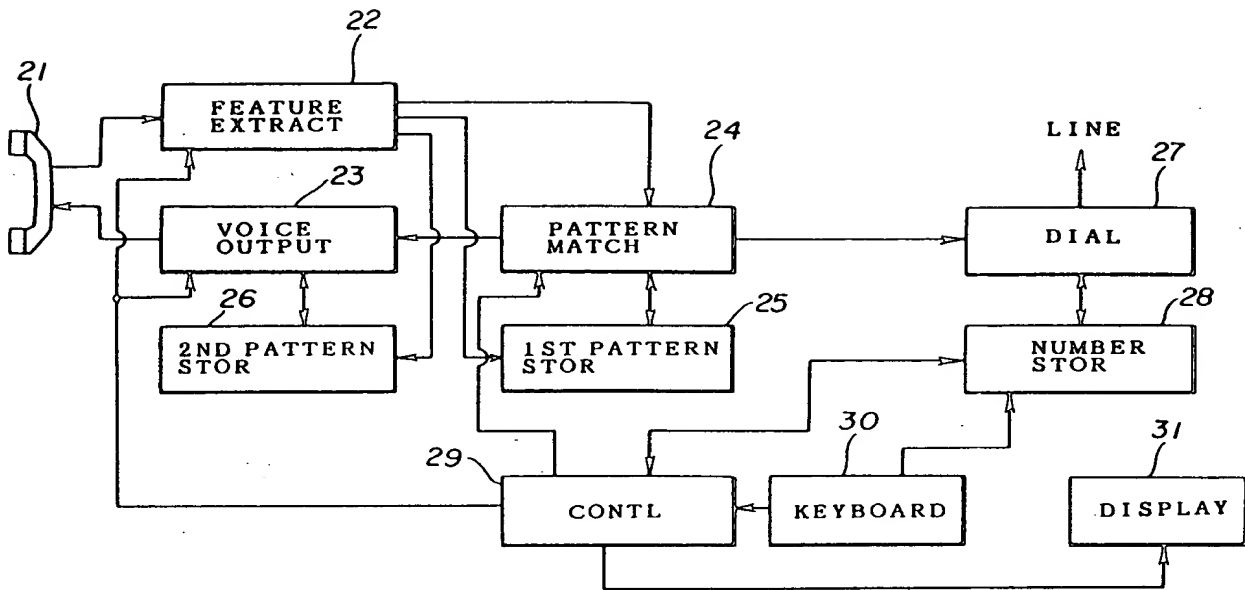
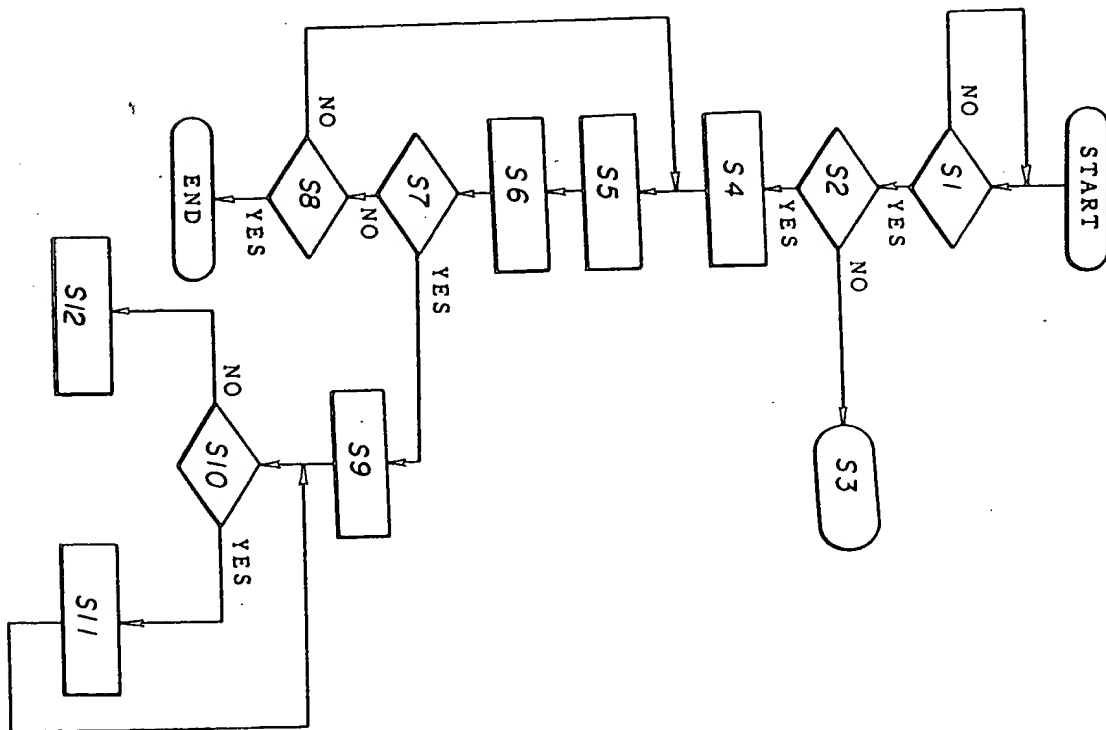


FIG.2



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FIG.3

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FIG. 5

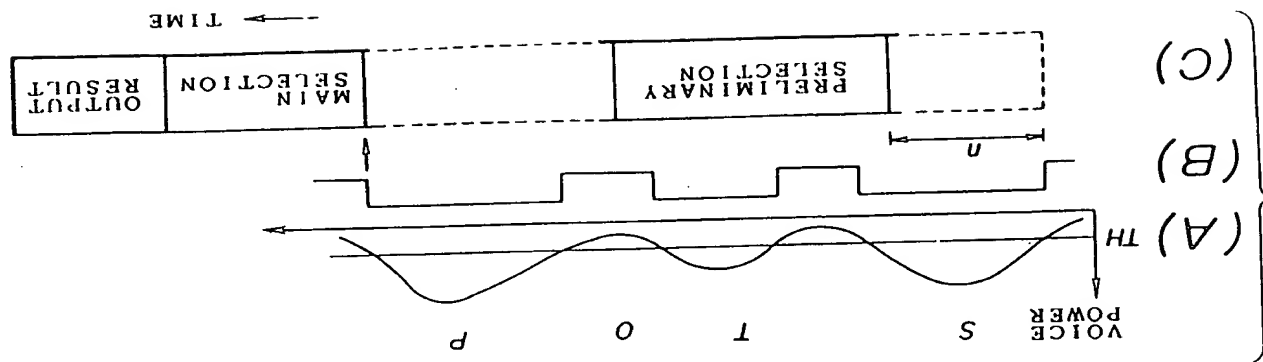


FIG. 4

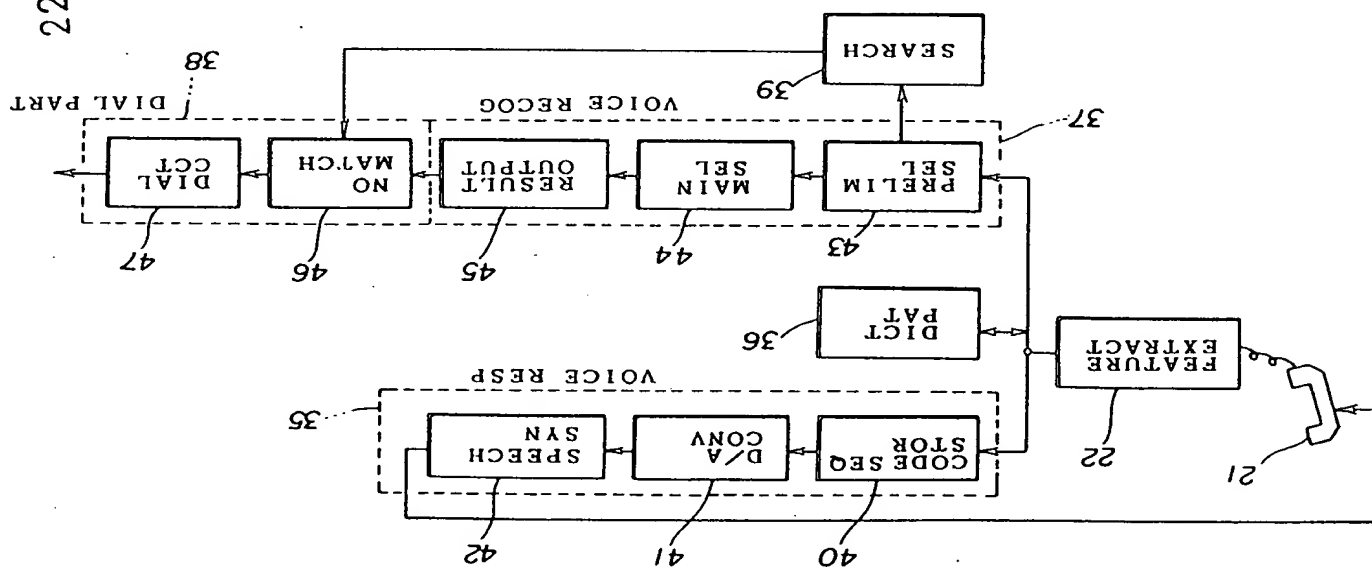


FIG. 6A

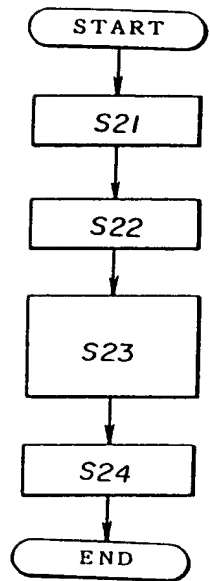
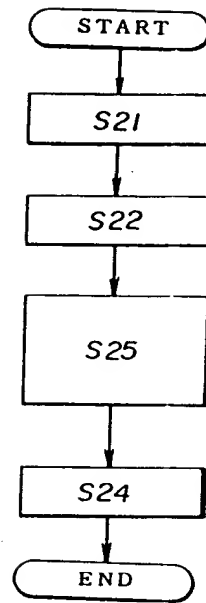


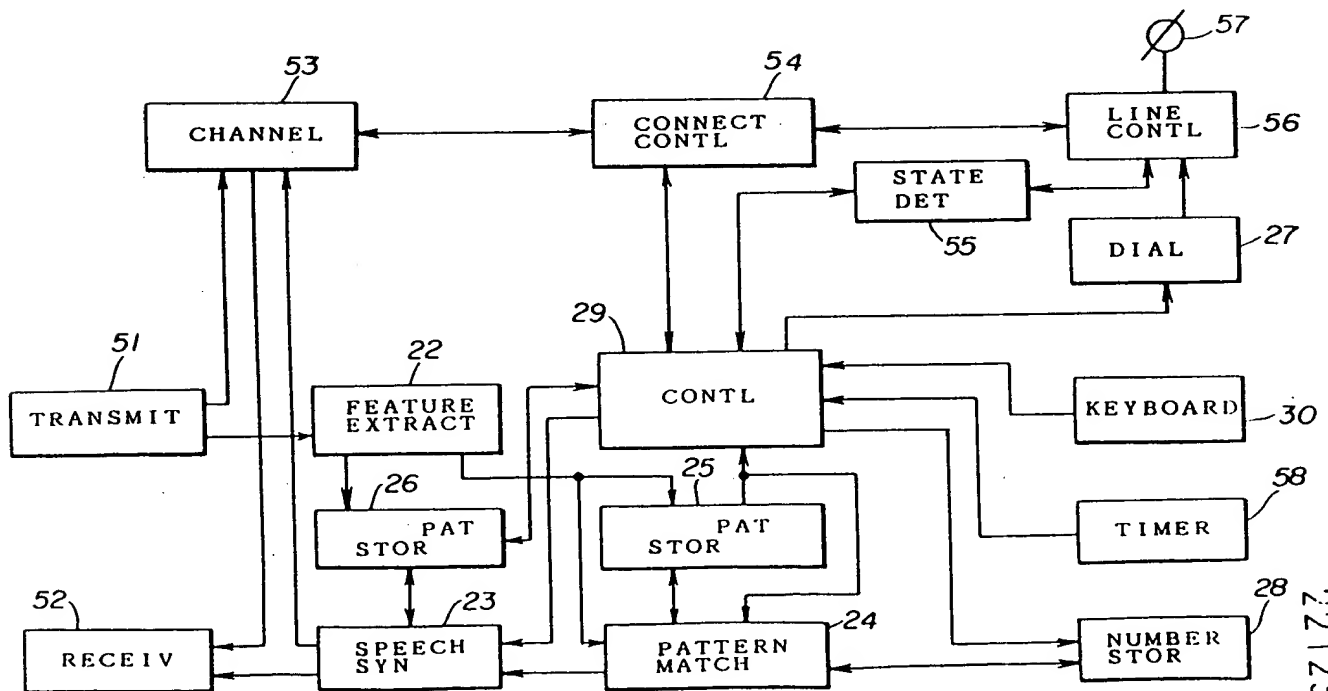
FIG. 6B



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FIG. 7



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FIG. 8

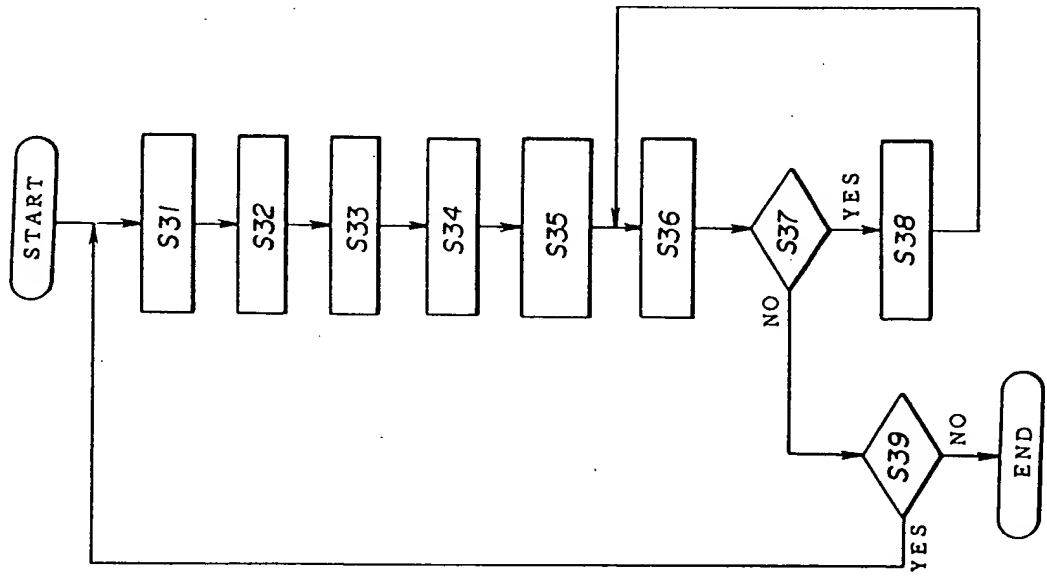


FIG. 9

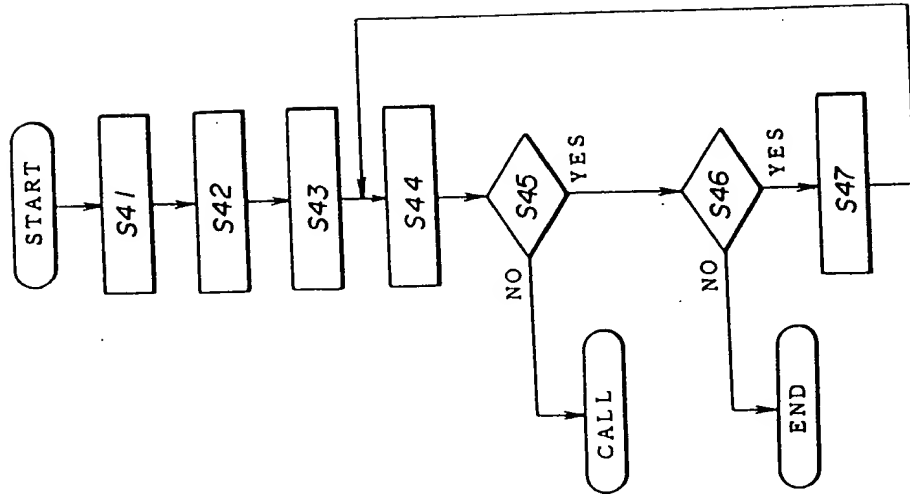


FIG. 10

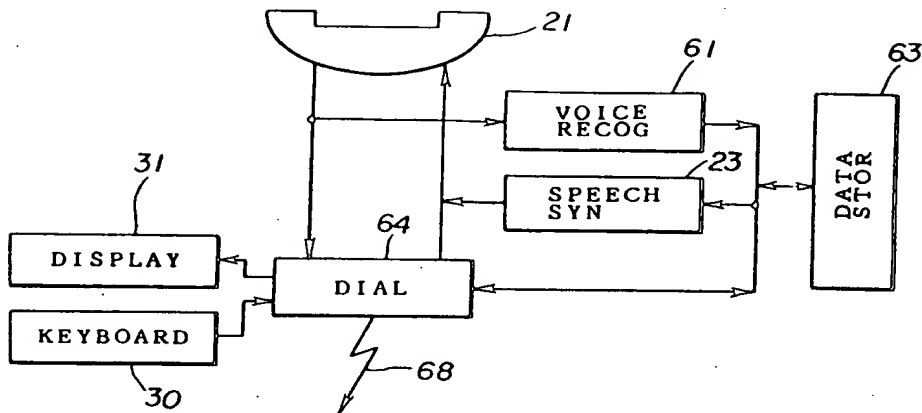


FIG. 11

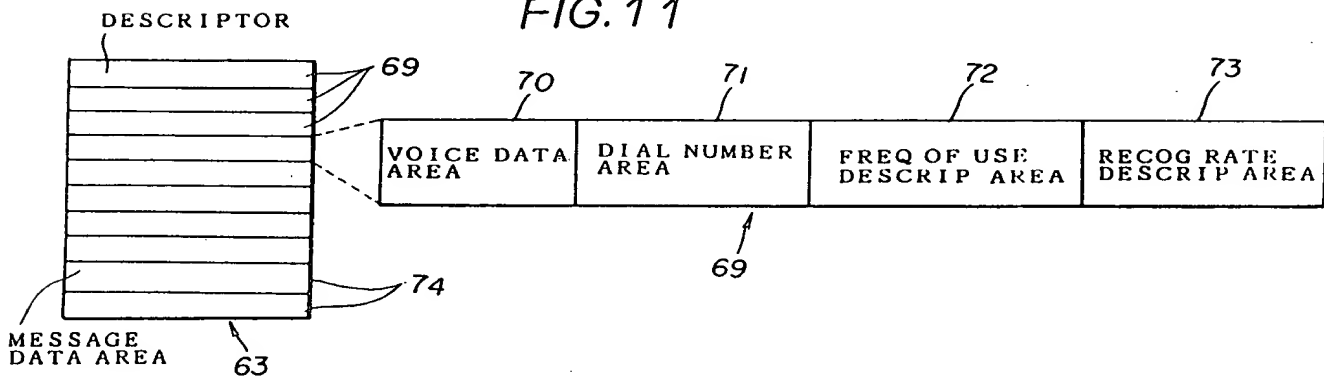


FIG. 13

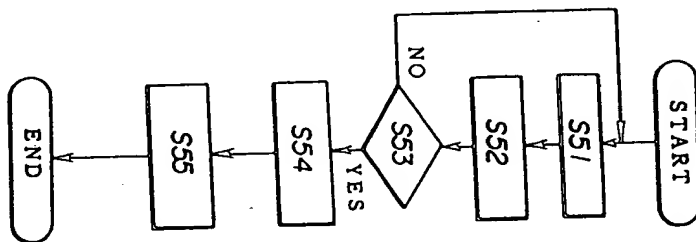
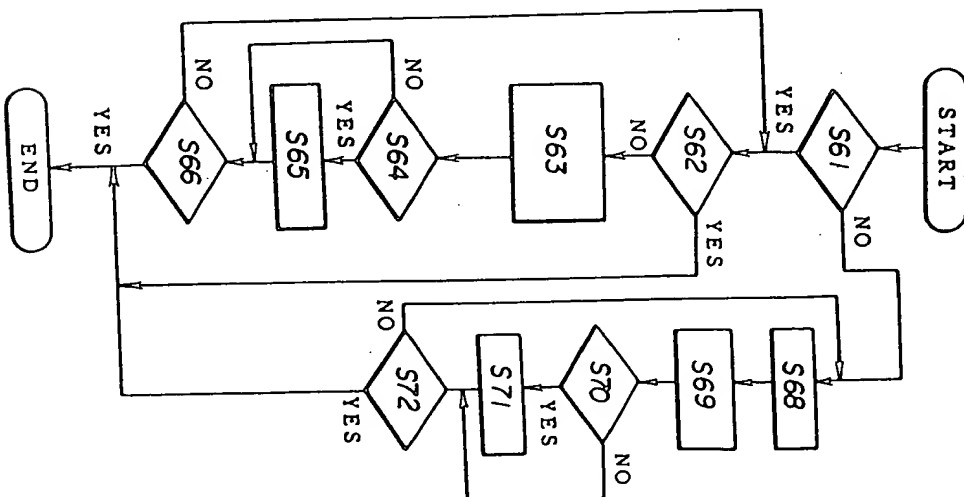


FIG. 14



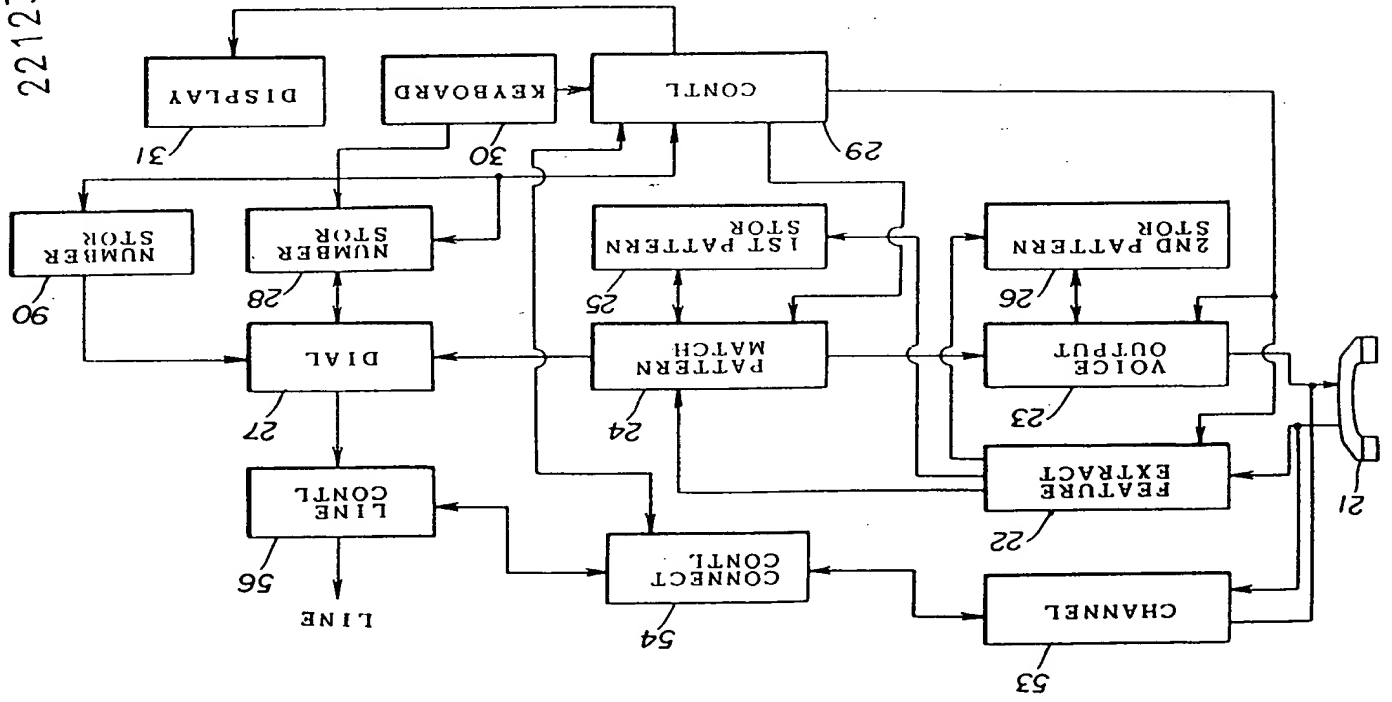
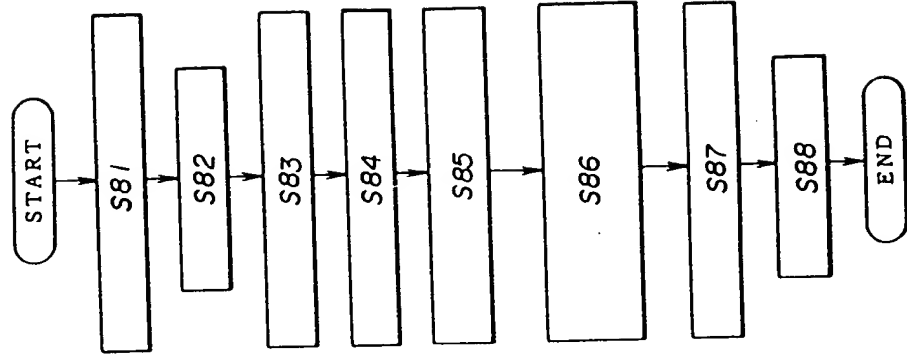
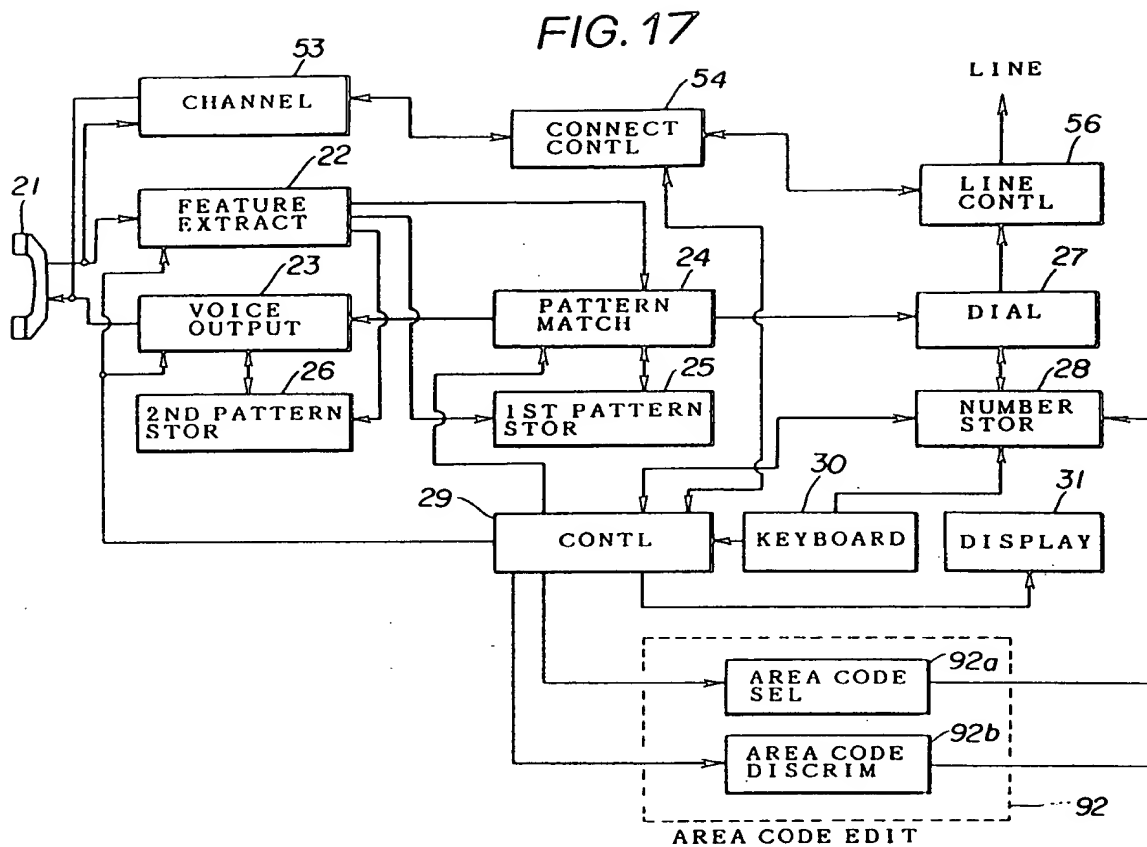


FIG. 15

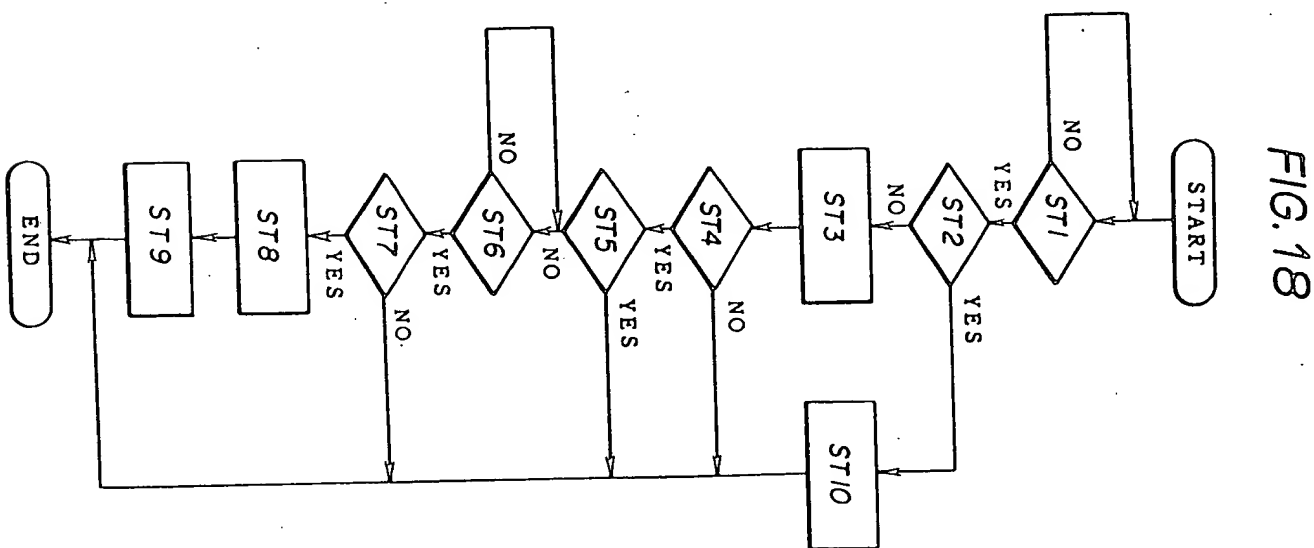
FIG. 16







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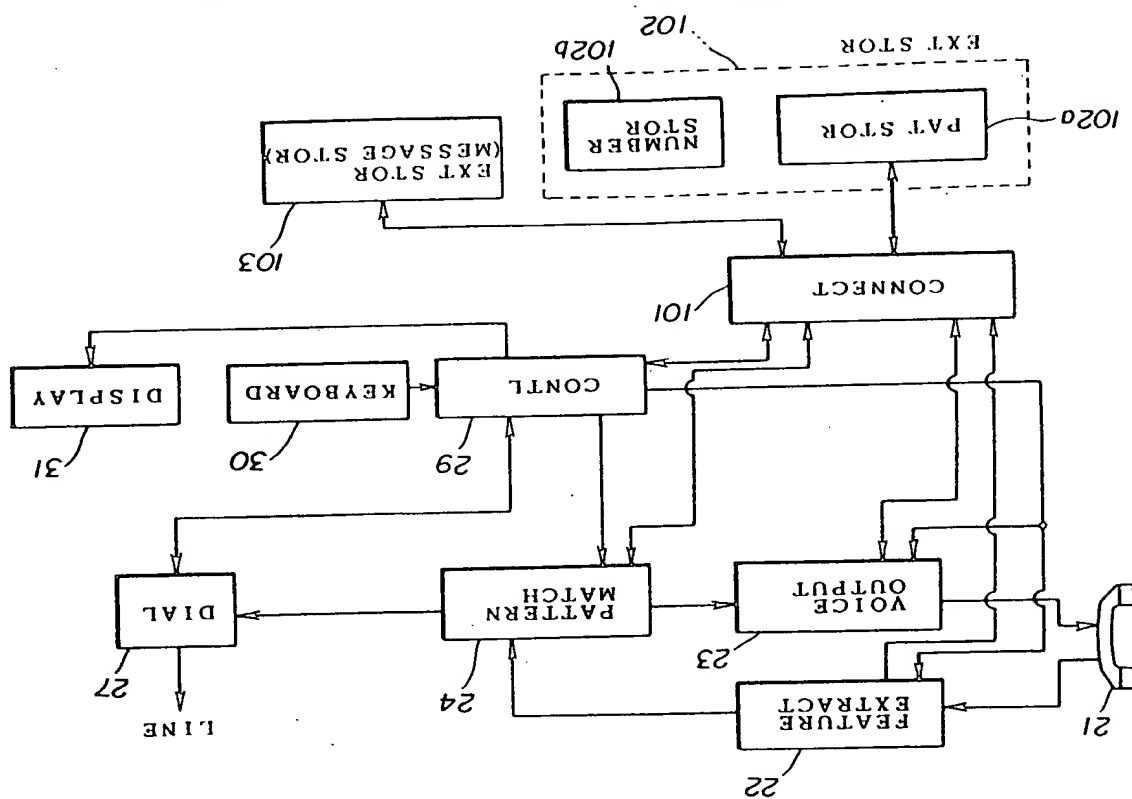


FIG. 20

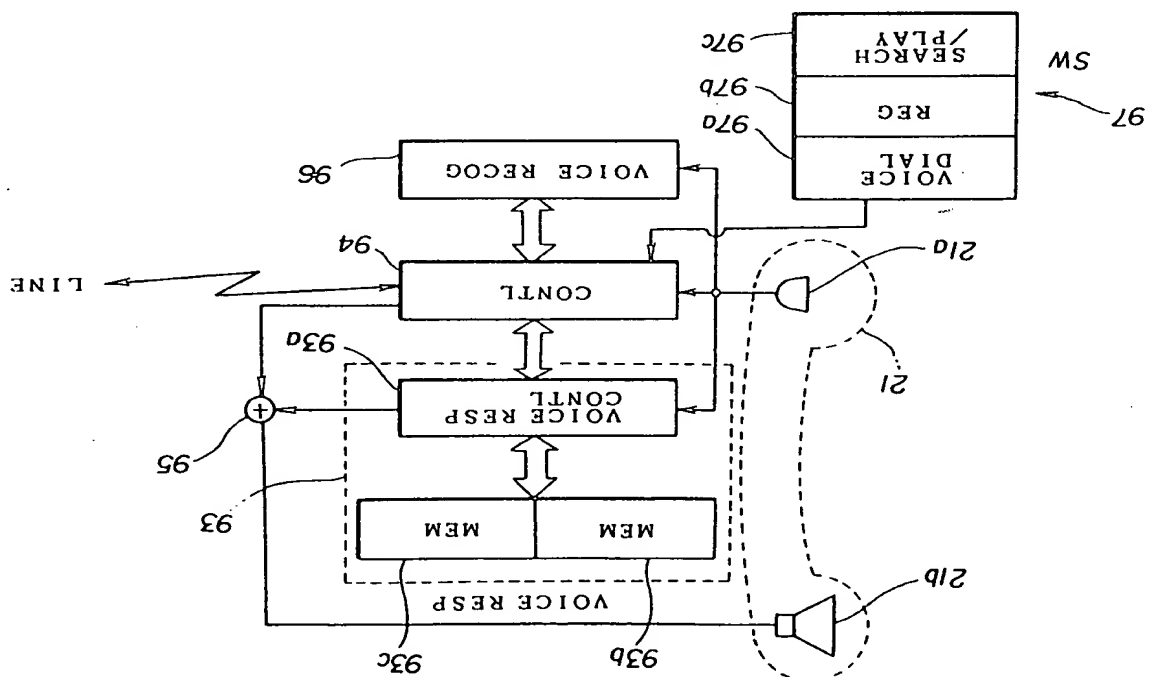


FIG. 19

FIG. 21

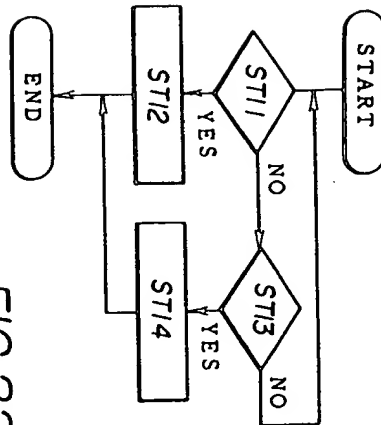


FIG. 23

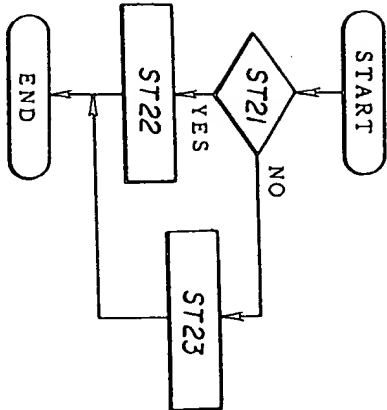
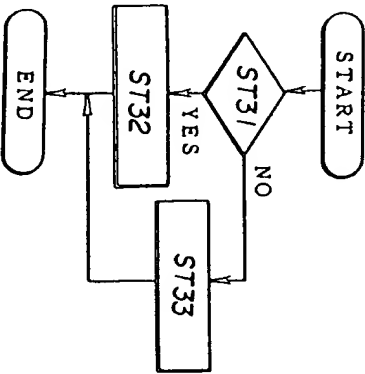
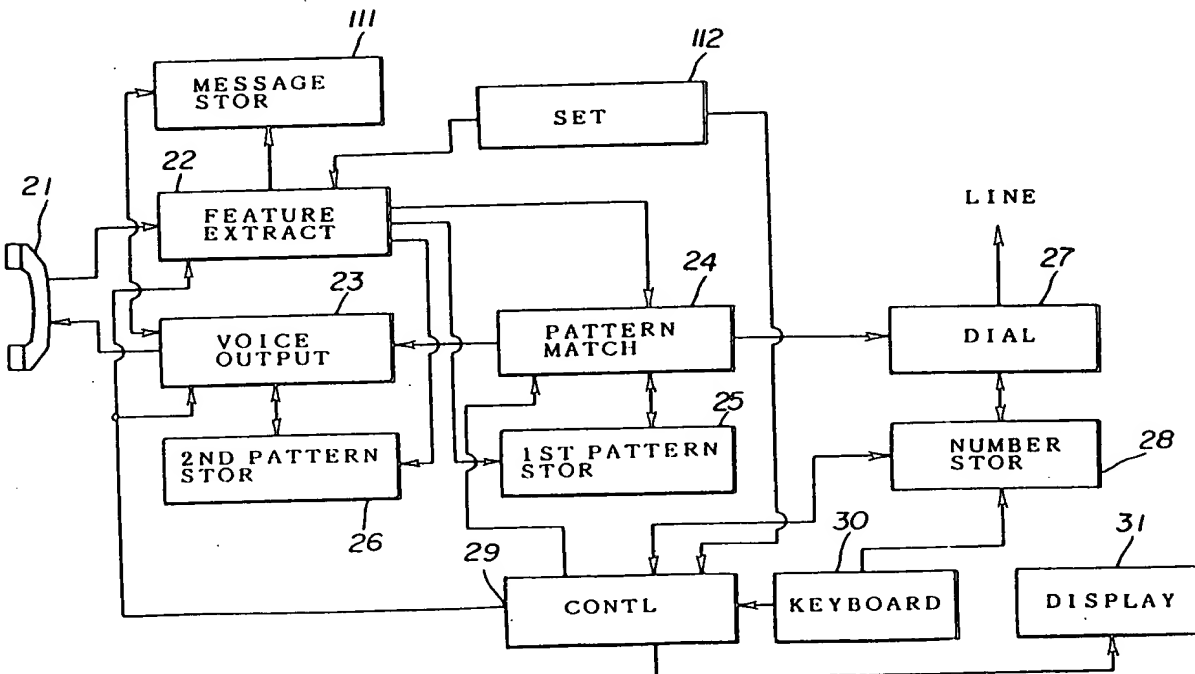


FIG. 25



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FIG. 22



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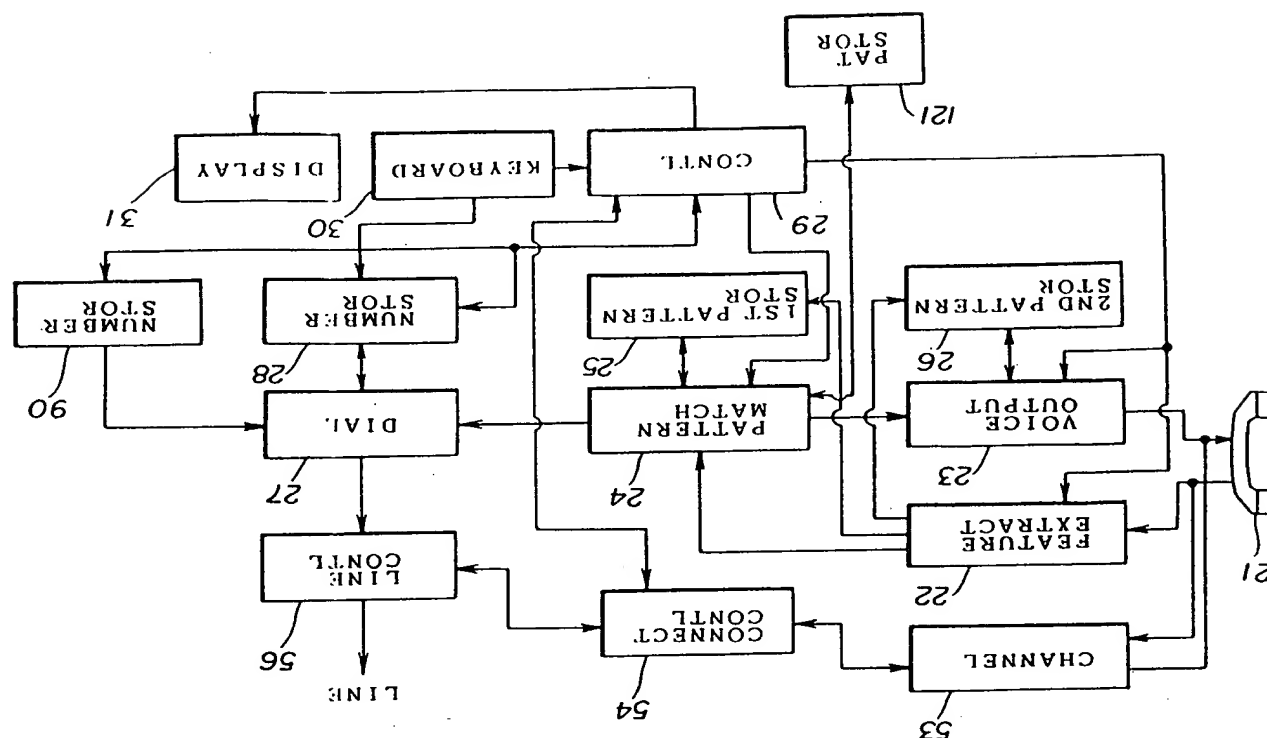


FIG. 26

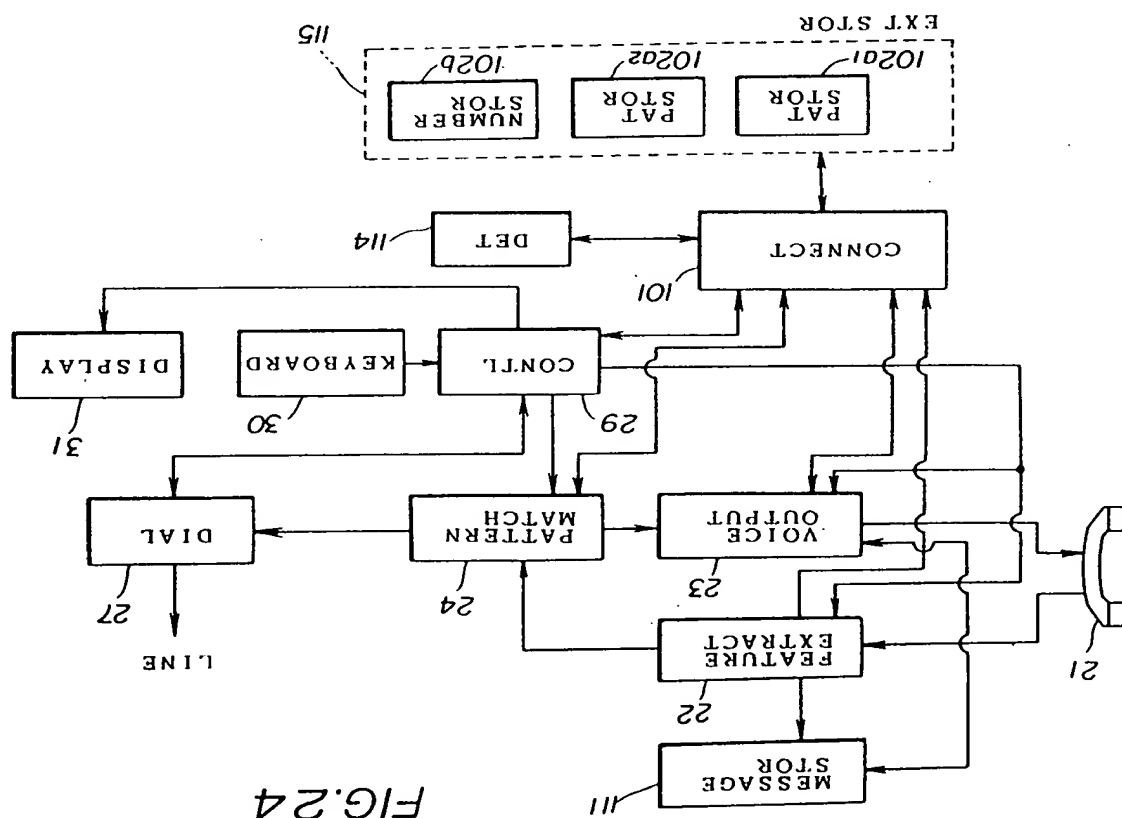


FIG. 24



"VOICE ACTUATED DIALING APPARATUS"

The present invention generally relates to voice actuated dialing apparatuses, and more particularly to a voice actuated dialing apparatus which recognizes a voice input and makes an automatic dialing to a registered destination telephone number which corresponds to the voice input.

In a conventional dialing apparatus of a telephone, there is a need to manually dial a telephone number of a destination subscriber when making a telephone call. Hence, a user must remember the telephone number of the destination subscriber or refer to a public or personal telephone directory, and there is a large burden on the user especially when the user frequently makes telephone calls to a large number of subscribers.

Accordingly, a voice actuated dialing apparatus (hereinafter simply referred to as a voice-dialing apparatus) was proposed in a Japanese Laid-Open Patent Application No.61-144157. According to this proposed apparatus, the user registers in advance standard patterns for voice recognition and response and corresponding telephone numbers. When making a telephone call, the user speaks a standard

1 pattern (key word) such as a name of the destination  
subscriber he wishes to call instead of manually  
dialing the telephone number of the destination  
subscriber. Then, the apparatus recognizes the  
5 standard pattern and automatically dials one of the  
registered telephone numbers corresponding to the  
recognized destination subscriber. As a result,  
there is no need for the user to remember telephone  
10 numbers and the user can make a telephone call  
without referring to the telephone directory.

However, when a large number of telephone  
numbers are registered, the user may forget the  
standard patterns for retrieving each of the  
registered telephone numbers. Furthermore, when the  
15 user's voice changes due to catching a cold or the  
like, there are cases where it becomes impossible to  
retrieve the desired telephone number because the  
apparatus cannot recognize the standard pattern from  
the changed voice. Hence, it is conceivable to  
20 successively output the registered standard patterns  
through speech synthesis and make the user designate  
the desired standard pattern when it is outputted so  
that the apparatus can automatically dial a telephone  
number corresponding to the desired standard  
25 pattern. But this conceivable method suffers a

1 problem in that the designation of the desired  
standard pattern is both troublesome and time  
consuming. In other words, the user may miss the  
desired standard pattern when he is interrupted while  
5 listening to the successive output of the registered  
standard patterns, such as when someone talks to the  
user. In addition, the user may erroneously  
designate a standard pattern which is outputted prior  
to the desired standard pattern. In these cases, the  
10 user must again listen to the registered standard  
patterns from the beginning so that he may correctly  
designate the desired standard pattern.

On the other hand, the voice-dialing  
apparatus is generally provided with a search  
function so that the relationship of the registered  
15 standard patterns and telephone numbers may be  
outputted by speech synthesis and/or display. This  
search function is used when the user forgets the  
standard pattern for retrieving a telephone number  
and also when the user forgets whether or not a  
20 certain telephone number is already registered. But  
the search is made by successively outputting the  
registered standard patterns and telephone numbers by  
speech synthesis and/or display, and in a worst case,  
25 the search must be made to last registered standard

1 pattern and telephone number before the desired  
standard pattern is found. As a result, there is a  
problem in that the search takes a long time to carry  
out. When a clustering is used for the search, it is  
5 possible to restrict a search range by entering a  
cluster number, but the user must remember which  
standard patterns belong to each of the clusters.

On the other hand, in the conventional  
voice-dialing apparatus, only one telephone number is  
10 registered with respect to one registered standard  
pattern. Hence, in the case where the destination  
subscriber has a plurality of telephone numbers but  
the line is busy when the telephone call is made  
responsive to the standard pattern corresponding to a  
15 first telephone number, the user must once hang up  
manually and call again later using the same standard  
pattern or make another call using another standard  
pattern corresponding to a second telephone number.

Thus, when it is only possible to register one  
20 telephone number with respect to one registered  
standard pattern, it is both troublesome and time  
consuming for the user to find a line which is not  
busy, especially when the user wishes to use the  
telephone call on urgent matters and when one or more  
25 telephone numbers of the destination subscriber is in

1 use for a long period of time.

But the voice-dialing apparatus can only  
make the automatic dialing when the destination  
telephone number is already registered. Thus, the  
5 user must register in advance the standard patterns  
for voice recognition and response and the  
corresponding telephone numbers. In other words, the  
user must manually dial a destination telephone  
number which is not registered, and when the user  
10 thereafter wishes to register this telephone number  
after finishing the call, the user must register the  
telephone number from the keys and also register the  
corresponding standard pattern by his voice. The  
user may register the telephone number and the  
15 corresponding standard pattern before calling that  
telephone number, but the user may be in a hurry and  
wish to make the call first. Therefore, when the  
user wishes to call the telephone number which is not  
registered and thereafter register that telephone  
20 number, there is a burden on the user in that the  
user must dial the same telephone number twice, that  
is, once to make the call manually and once to  
register the telephone number.

In addition, when registering the standard  
25 patterns for voice recognition and response and the



1 corresponding telephone numbers, an area code of the  
telephone number for a first region is usually not  
registered when the voice-dialing apparatus is used  
in the first region. But when the voice-dialing  
5 apparatus is moved to a second region having an area  
code different from that of the first region, the  
voice-dialing can no longer be made to the  
destination subscriber in the first region because  
the area code of the first region which must be  
10 dialed before the destination telephone number is not  
registered together with the destination telephone  
number. Similarly, when the voice-dialing apparatus  
is moved to the second region and the voice-dialing  
is to be made to the destination subscriber in the  
15 second region, the call cannot be made because the  
area code of the second region which does not need to  
be dialed when in the second region is registered  
together with the destination telephone number  
because the voice-dialing apparatus was originally  
20 used in the first region. Therefore, when moving the  
voice-dialing apparatus from the first region to the  
second region with the different area code, the user  
must re-register all of the telephone numbers in the  
first and second regions so as to add or delete the  
25 area codes where necessary.

1 There are answering phones which record on  
a magnetic tape or the like a message from a caller  
when the user is out, and play back the message at an  
arbitrary time. However, there has not been proposed  
5 an answering phone which has the voice-dialing  
function. On the other hand, the voice recognition  
rate of the voice-dialing apparatus is not 100%, and  
it is necessary to output the result of the voice  
recognition by a speech synthesis, for example, so  
10 that the user can confirm the destination subscriber  
before the call is actually made. Recently, there  
are answering phones provided with a speech synthesis  
apparatus which records and plays back the message in  
a form of a digitally encoded audio signal which is  
15 unaffected by a deterioration and the like of the  
magnetic tape. Thus, when applying the voice-dialing  
apparatus to such an answering phone, it is  
conceivable to use a speech synthesis apparatus in  
common for the confirmation of the result of the  
20 voice recognition and for the play back of the  
recorded message.  
However, when a part for storing the  
standard patterns and a part for storing the  
telephone numbers are provided inside the telephone  
25 set, the voice-dialing can only be made from the

1 telephone set to which the standard patterns and the  
telephone numbers have been registered. In addition,  
when a part for recording the message is provided  
inside the answering phone, a total time for  
5 recording the messages becomes fixed and it is  
difficult to cope with the user's needs. In  
addition, a hardware is required exclusively for  
setting the telephone set to an answering mode.  
Furthermore, it is difficult to maintain the  
10 telephone set compact when the part for storage is  
provided inside the telephone set.

Moreover, when the voice-dialing apparatus  
is applied to the answering phone provided with the  
speech synthesis apparatus, it is a waste that one  
15 speech synthesis apparatus must be provided for the  
speech recognition and another speech synthesis  
apparatus must be provided for the answering phone.  
Further, the answering phone must be manually set to  
the answering mode by the user when the user goes  
20 out, and the functions of the answering phone are not  
carried out when the user forgets to set the  
answering phone to the answering mode.

As described before, the line may be busy  
when the dialing is made. In this case, it is  
25 possible to make the voice-dialing later when the

1 destination telephone number is already registered.  
But it is necessary to manually dial the same  
telephone number again when this telephone number is  
not registered. There are ordinary telephones  
5 provided with a re-dialing function, wherein a  
re-dialing is made to a last dialed telephone number  
responsive to a manipulation of a re-dial button.  
However, there are problems in that the telephone set  
must be provided with the re-dial button exclusively  
10 for instructing the re-dial operation and the user  
must still push the re-dial button in order to make  
the call. In addition, when the user forgets the  
last dialed telephone number, the user may  
erroneously re-dial to a wrong telephone number  
15 because there is no means for the user to confirm the  
last dialed telephone number.

Furthermore, as described before, the voice  
recognition rate of the voice-dialing apparatus is  
not 100%, and it is necessary to output the result of  
20 the voice recognition by a speech synthesis, for  
example, so that the user can confirm the destination  
subscriber before the call is actually made. The  
user may confirm the result of the voice recognition  
by voice or by pushing a confirm button, for  
25 example. Therefore, there is considerable burden on

1 the user in that the user must confirm the  
destination subscriber with every call made by the  
voice-dialing.

Next, a description will be given on an  
example of a conventional voice-dialing apparatus by  
referring to FIG.1 so as to explain some of the  
problems referred above. The voice-dialing apparatus  
generally has a handset 11, a voice recognition part  
12 coupled to the handset 11, and an automatic  
dialing part 13 for controlling a coupling between  
the handset 11 and a subscriber line 14. When the  
user enters by voice a name or a word corresponding  
to a standard pattern (that is, a key word) of a  
destination subscriber through the handset 11, the  
voice recognition part 12 recognizes the standard  
pattern and selects one of registered telephone  
numbers corresponding to the recognized standard  
pattern. The automatic dialing part 13 makes the  
automatic dialing to the registered telephone number  
selected by the voice recognition part 12.

In this conventional voice-dialing  
apparatus, a number of telephone numbers which may be  
registered is limited. When the telephone numbers  
are already registered to the full capacity and some  
new telephone numbers need to be registered, it is

1 necessary to delete a number of registered telephone  
numbers corresponding to the number of new telephone  
numbers to be registered. In this case, it is useful  
to utilize the search function so as to check all of  
the registered telephone numbers and select those  
telephone numbers which are unlikely to be used  
frequently in the future. However, contrary to the  
user's impression, some of the selected telephone  
numbers may actually be used frequently, and thus the  
user may erroneously delete the telephone numbers  
which are frequently used.

In addition, it is impossible to set the  
voice recognition rate to 100%. In addition, the  
user's voice may change with time, and for this  
reason, the recognition rate tends to gradually  
deteriorate with time. Accordingly, in actual  
practice, the voice data which is already registered  
is renewed or re-registered in order to cope with  
such deterioration in the voice recognition rate.

However, it is impossible for the user to  
determine which registered standard pattern has a  
poor recognition rate. Therefore, there is a problem  
in that it is extremely difficult for the user to  
accurately renew or re-register the voice data which  
actually needs to be renewed or re-registered.

1           On the other hand, when registering the  
destination subscribers, the user first enters the  
telephone number of the destination subscriber from  
the keys and then enters the standard pattern for  
5   identifying the destination subscriber by voice. The  
entries by the keys and voice may be made in  
conformance with a guidance (voice or display)  
provided by the voice-dialing apparatus. But when a  
large number of destination subscribers are  
10 registered at one time, it takes a considerable time  
to complete the registration. On the other hand,  
when the registration is carried out in small  
numbers, it is difficult for the user to keep track  
of which destination subscribers have been registered  
15 and which destination subscribers need to be  
registered.

          Accordingly, it is a general object of the  
present invention to provide a novel and useful  
voice-dialing apparatus in which the problems  
described above are eliminated.

20           According to one aspect of the present  
invention, there is provided a voice actuated dialing  
apparatus comprising input/output means for inputting  
and outputting data, feature extraction means for  
25 extracting a feature of an input data received

1   through said input/output means, storage means for  
storing standard patterns and corresponding telephone  
numbers of destination subscribers as registered  
data, pattern matching means for comparing a standard  
5   pattern of the feature extracted by said feature  
extraction means with the standard patterns stored in  
said storage means so as to recognize a predetermined  
one of the stored standard patterns which matches the  
standard pattern of the extracted feature, speech  
10 synthesis means for outputting through said  
input/output means a speech corresponding to said  
predetermined stored standard pattern read out from  
said storage means so as to confirm a result of the  
recognition made in said pattern matching means,  
15 dialing means for dialing to a predetermined one of  
the telephone numbers stored in said storage part and  
corresponding to said predetermined standard pattern  
in a voice-dialing mode, and control means for  
controlling operation sequences of said feature  
20 extraction means, said storage means, said pattern  
matching means, said speech synthesis means and said  
dialing means, said control means successively  
outputting to said input/output means at least a part  
of the registered data stored in said storage means  
25 in response to a search instruction received from

1 said input/output means designating the part to be  
successively outputted.

According to another aspect of the present invention, there is provided a voice actuated dialing apparatus comprising input/output means for inputting and outputting data, feature extraction means for extracting a feature of an input data received through said input/output means, storage means for storing standard patterns and corresponding telephone numbers of destination subscribers as registered data, said storage means storing a plurality of telephone numbers with respect to predetermined ones of the subscribers, pattern matching means for comparing a standard pattern of the feature extracted by said feature extraction means with the standard patterns stored in said storage means so as to recognize a predetermined one of the stored standard patterns which matches the standard pattern of the extracted feature, speech synthesis means for outputting through said input/output means a speech corresponding to said predetermined stored standard pattern read out from said storage means so as to confirm a result of the recognition made in said pattern matching means, dialing means for dialing to a predetermined one of the telephone numbers stored

1 in said storage part and corresponding to said  
predetermined standard pattern in a voice-dialing mode, and control means for controlling operation sequences of said feature extraction means, said storage means, said pattern matching means, said speech synthesis means and said dialing means, said control means controlling said dialing means to automatically dial another telephone number which corresponds to said predetermined standard pattern in a voice-dialing mode when a line of a first dialed telephone number is busy and a plurality of telephone numbers are stored with respect to said predetermined standard pattern.

According to another aspect of the present invention, there is provided a voice actuated dialing apparatus comprising input/output means for inputting and outputting data, feature extraction means for extracting a feature of an input data received through said input/output means, storage means for storing standard patterns and corresponding telephone numbers of destination subscribers as registered data and for storing a last dialed telephone number, pattern matching means for comparing a standard pattern of the feature extracted by said feature extraction means with the standard patterns stored in

1 said storage means so as to recognize a predetermined  
one of the stored standard patterns which matches the  
standard pattern of the extracted feature, speech  
synthesis means for outputting through said  
5 input/output means a speech corresponding to said  
predetermined stored standard pattern read out from  
said storage means so as to confirm a result of the  
recognition made in said pattern matching means,  
dialing means for dialing to a predetermined one of  
10 the telephone numbers stored in said storage part and  
corresponding to said predetermined standard pattern  
in a voice-dialing mode, and control means for  
controlling operation sequences of said feature  
extraction means, said storage means, said pattern  
15 matching means, said speech synthesis means and said  
dialing means, said control means controlling said  
storage means to store said last dialed telephone  
number in said storage means as registered data in  
response to a register instruction received from said  
20 input/output means, said register instruction  
accompanying a standard pattern which corresponds to  
said last dialed telephone number and is entered from  
said input/output means through said feature  
extraction means.

25 According to another aspect of the present

1 invention, there is provided a voice actuated dialing  
apparatus comprising input/output means for inputting  
and outputting data, feature extraction means for  
extracting a feature of an input data received  
5 through said input/output means, storage means for  
storing standard patterns and corresponding telephone  
numbers of destination subscribers as registered  
data, pattern matching means for comparing a standard  
pattern of the feature extracted by said feature  
10 extraction means with the standard patterns stored in  
said storage means so as to recognize a predetermined  
one of the stored standard patterns which matches the  
standard pattern of the extracted feature, speech  
synthesis means for outputting through said  
15 input/output means a speech corresponding to said  
predetermined stored standard pattern read out from  
said storage means so as to confirm a result of the  
recognition made in said pattern matching means,  
dialing means for dialing to a predetermined one of  
20 the telephone numbers stored in said storage part and  
corresponding to said predetermined standard pattern  
in a voice-dialing mode, area code editing means for  
editing an area code of the telephone numbers stored  
in said storage means, and control means for  
25 controlling operation sequences of said feature

1 extraction means, said storage means, said pattern  
matching means, said speech synthesis means, said  
dialing means and said area code editing means, said  
control means controlling said area code editing  
5 means to delete and/or renew at least an area code of  
a specific telephone number stored in said storage  
means in response to an edit instruction received  
from said input/output means.

According to another aspect of the present  
10 invention, there is provided a voice actuated dialing  
apparatus comprising input/output means for inputting  
and outputting data, feature extraction means for  
extracting a feature of an input data received  
through said input/output means, storage means for  
15 storing standard patterns and corresponding telephone  
numbers of destination subscribers as registered data  
and for storing a last dialed telephone number,  
pattern matching means for comparing a standard  
pattern of the feature extracted by said feature  
20 extraction means with the standard patterns stored in  
said storage means so as to recognize a predetermined  
one of the stored standard patterns which matches the  
standard pattern of the extracted feature, speech  
synthesis means for outputting through said  
25 input/output means a speech corresponding to said

1 predetermined stored standard pattern read out from  
said storage means so as to confirm a result of the  
recognition made in said pattern matching means,  
dialing means for dialing to a predetermined one of  
5 the telephone numbers stored in said storage part and  
corresponding to said predetermined standard pattern  
in a voice-dialing mode, and control means for  
controlling operation sequences of said feature  
extraction means, said storage means, said pattern  
10 matching means, said speech synthesis means and said  
dialing means, said control means having means for  
detecting whether or not said last dialed telephone  
number is already stored in said storage means as  
registered data.

According to another aspect of the present  
15 invention, there is provided a voice actuated dialing  
apparatus comprising input/output means for inputting  
and outputting data, feature extraction means for  
extracting a feature of an input data received  
20 through said input/output means, storage means for  
storing standard patterns and corresponding telephone  
numbers of destination subscribers as registered data  
and for storing messages related to an answering a  
phone mode, pattern matching means for comparing a  
25 standard pattern of the feature extracted by said

1 feature extraction means with the standard patterns  
stored in said storage means so as to recognize a  
predetermined one of the stored standard patterns  
which matches the standard pattern of the extracted  
5 feature, speech synthesis means for outputting  
through said input/output means a speech  
corresponding to said predetermined stored standard  
pattern read out from said storage means so as to  
confirm a result of the recognition made in said  
10 pattern matching means, dialing means for dialing to  
a predetermined one of the telephone numbers stored  
in said storage part and corresponding to said  
predetermined standard pattern in a voice-dialing  
mode, and control means for controlling operation  
15 sequences of said feature extraction means, said  
storage means, said pattern matching means, said  
speech synthesis means and said dialing means, said  
control means using said storage means and said  
speech synthesis means in common during the  
20 voice-dialing mode and the answering phone mode.

According to another aspect of the present  
invention, there is provided a voice actuated dialing  
apparatus comprising input/output means for inputting  
and outputting data, feature extraction means for  
25 extracting a feature of an input data received

1 through said input/output means, first storage means  
for storing standard patterns and corresponding  
telephone numbers of destination subscribers as  
registered data, second storage means for storing  
5 messages related to an answering phone mode, pattern  
matching means for comparing a standard pattern of  
the feature extracted by said feature extraction  
means with the standard patterns stored in said first  
storage means so as to recognize a predetermined one  
10 of the stored standard patterns which matches the  
standard pattern of the extracted feature, speech  
synthesis means for outputting through said  
input/output means a speech corresponding to said  
predetermined stored standard pattern read out from  
15 said first storage means so as to confirm a result of  
the recognition made in said pattern matching means,  
dialing means for dialing to a predetermined one of  
the telephone numbers stored in said first storage  
part and corresponding to said predetermined standard  
20 pattern in a voice-dialing mode, and control means  
for controlling operation sequences of said feature  
extraction means, said first and second storage  
means, said pattern matching means, said speech  
synthesis means and said dialing means, said control  
25 means using said speech synthesis means in common



1 during the voice-dialing mode and the answering phone  
mode, at least one of said first and second storage  
means being detachable with respect to said voice  
actuated dialing apparatus.

5 According to another aspect of the present  
invention, there is provided a voice actuated dialing  
apparatus comprising input/output means for inputting  
and outputting data, feature extraction means for  
extracting a feature of an input data received  
10 through said input/output means, storage means for  
storing standard patterns and corresponding telephone  
numbers of destination subscribers as registered data  
and for storing a last dialed telephone number,  
pattern matching means for comparing a standard  
15 pattern of the feature extracted by said feature  
extraction means with the standard patterns stored in  
said storage means so as to recognize a predetermined  
one of the stored standard patterns which matches the  
standard pattern of the extracted feature, speech  
20 synthesis means for outputting through said  
input/output means a speech corresponding to said  
predetermined stored standard pattern read out from  
said storage means so as to confirm a result of the  
recognition made in said pattern matching means,  
25 dialing means for dialing to a predetermined one of

1 the telephone numbers stored in said storage part and  
corresponding to said predetermined standard pattern  
in a voice-dialing mode, and control means for  
controlling operation sequences of said feature  
5 extraction means, said storage means, said pattern  
matching means, said speech synthesis means and said  
dialing means, said control means controlling said  
dialing means to re-dial said last dialed telephone  
number stored in said storage means in response to a  
10 re-dial instruction.

Another and more specific object of the  
present invention is to provide a voice-dialing  
apparatus having means for making a search with  
respect to registered data within a selected search  
15 range. According to the voice-dialing apparatus of  
the present invention, it is possible to make the  
search efficiently.

Still another object of the present  
invention is to provide a voice-dialing apparatus  
20 having means for automatically selecting a search  
range in which a search is to be made with respect to  
registered data. According to the voice-dialing  
apparatus of the present invention, it is possible to  
find a desired registered data with an extremely  
25 small burden on the part of the user.

1 A further object of the present invention  
is to provide a voice-dialing apparatus having means  
for registering a plurality of telephone numbers with  
respect to one destination subscriber. According to  
5 the voice-dialing apparatus of the present invention,  
it is possible to automatically dial a telephone  
number of a destination subscriber when the line is  
busy for another telephone number of the same  
destination subscriber.

10 Another object of the present invention is  
to provide a voice-dialing apparatus having means for  
storing together with the registered data an  
information related to a frequency of use of each  
registered telephone number and/or an information  
15 related to a recognition rate of each registered key  
word (that is, name of destination subscriber).

According to the voice-dialing apparatus of the  
present invention, it is possible to edit the  
registered data most effectively by use of the stored  
20 information, where the editing includes deletion,  
addition and renewal of the registered data.

Still another object of the present  
invention is to provide a voice-dialing apparatus  
having means for registering a last dialed telephone  
25 number. According to the voice-dialing apparatus of

1 the present invention, it is possible to reduce the  
burden on the user when registering telephone numbers.

A further object of the present invention  
is to provide a voice-dialing apparatus having means  
5 for extracting registered telephone numbers with or  
without an area code. According to the voice-dialing  
apparatus of the present invention, it is possible to  
adjust the registered data when the voice-dialing  
apparatus is moved from a first region to a second  
10 region which uses an area code different from that of  
the first region.

Another object of the present invention is  
to provide a voice-dialing apparatus having means for  
detecting whether or not a dialed telephone number is  
15 already registered. According to the voice-dialing  
apparatus of the present invention, it is possible to  
register by a simple operation the dialed telephone  
number which is not yet registered.

Still another object of the present  
20 invention is to provide a voice-dialing apparatus in  
which a voice output part is used in common for a  
voice-dialing and an answering phone. According to  
the voice-dialing apparatus of the present invention,  
it is possible to realize the answering phone mode in  
25 addition to the voice-dialing mode without making the

1 construction of the voice-dialing apparatus context.

5 A further object of the present invention  
is to provide a voice-dialing apparatus which has a  
detachable external storage. There are two kinds of  
external storages, a first kind which stores the  
standard patterns for recognition and response and a  
second kind which stores messages related to the  
answering phone mode. According to the voice-dialing  
apparatus of the present invention, the flexibility  
10 of the apparatus is improved because the storage  
capacity of the first and second kinds of external  
storages may be selected depending on the needs of  
the user. Furthermore, the user may make a  
voice-dialing on an arbitrary voice-dialing apparatus  
15 by connecting thereto the first external storage.

Another object of the present invention is  
to provide a voice-dialing apparatus having means for  
setting a mode to one of a normal mode in which a  
voice-dialing can be made and an answering phone  
20 mode. According to the voice-dialing apparatus of  
the present invention, it is possible to effectively  
utilize a voice output part for both the normal mode  
and the answering phone mode.

Still another object of the present  
25 invention is to provide a voice-dialing apparatus

1 having means for detecting whether or not a  
detachable external storage for storing standard  
patterns for recognition and response and  
corresponding telephone numbers is connected to the  
5 voice-dialing apparatus. According to the  
voice-dialing apparatus of the present invention, it  
is possible to automatically switch a mode to a  
normal mode in which the voice-dialing can be made  
and an answering phone mode depending on whether or  
not the external storage is connected to the  
10 voice-dialing apparatus, and the burden on the user  
is extremely small in setting the mode of the  
voice-dialing apparatus.

Another object of the present invention  
is to provide a voice-dialing apparatus having means  
for re-dialing to a last dialed telephone number.  
According to the voice-dialing apparatus of the  
15 present invention, it is possible to re-dial the last  
dialed telephone number by a simple operation and  
there is no need to re-enter the telephone number by  
20 voice.

Another object of the present invention is  
to provide a voice-dialing apparatus having means for  
outputting information related to a last dialed  
25 telephone number before re-dialing. According to the

1 voice-dialing apparatus of the present invention, it  
is possible for the user to confirm the destination  
subscriber to which the re-dialing is made before the  
actual re-dialing.

5 Still another object of the present  
invention is to provide a voice-dialing apparatus  
having means for prestoring at least a standard  
pattern of a re-dial instruction. According to the  
voice-dialing apparatus of the present invention,  
10 there is no need for the user to register the  
standard pattern of the re-dial instruction, and the  
re-dialing to a last dialed telephone number may be  
instructed by voice. This means that there is no  
need to provide a key exclusively for instructing the  
15 re-dialing.

A further object of the present invention  
is to provide a voice-dialing apparatus having means  
for outputting information related to a telephone  
number which is to be dialed responsive to a voice  
20 instruction for confirmation by the user, and means  
for automatically dialing to the telephone number  
when no instruction is received within a  
predetermined time from a time when the information  
is outputted. According to the voice-dialing  
25 apparatus of the present invention, it is possible to

1 minimize the burden on the user in confirming the  
recognition result of the voice-dialing apparatus.  
Other objects and further features of the  
present invention will be apparent from the following  
5 detailed description when read in conjunction with  
the accompanying drawings.

FIG.1 is a system block diagram generally  
showing an example of a conventional voice-dialing  
apparatus;

10 FIG.2 is a system block diagram showing a  
first embodiment of a voice-dialing apparatus  
according to the present invention;

FIG.3 is a flow chart for explaining an  
operation of a control part of the first embodiment;

15 FIG.4 is a system block diagram showing a  
second embodiment of the voice-dialing apparatus  
according to the present invention;

FIGS.5(A) through 5(C) are time charts for  
explaining a preliminary selection and a main  
20 selection in the second embodiment;

FIGS.6A and 6B are flow charts for  
explaining an operation of a control part of the  
second embodiment;

FIG.7 is a system block diagram showing a  
25 third embodiment of the voice-dialing apparatus

1 according to the present invention;

FIG.8 is a flow chart for explaining an  
operation of a control part of the third embodiment  
when registering data;

5 FIG.9 is a flow chart for explaining an  
operation of the control part of the third embodiment  
when making an automatic dialing;

10 FIG.10 is a system block diagram showing a  
fourth embodiment of the voice-dialing apparatus  
according to the present invention;

FIG.11 is a diagram for explaining a  
structure of a data storage of the fourth embodiment;

15 FIG.12 shows an arrangement of keys of a  
keyboard of the fourth embodiment together with a  
display part;

FIG.13 is a flow chart for explaining an  
operation of a control part of the fourth embodiment  
in a recognition mode;

20 FIG.14 is a flow chart for explaining an  
operation of the control part of the fourth  
embodiment in a delete mode;

25 FIG.15 is a system block diagram showing a  
fifth embodiment of the voice-dialing apparatus  
according to the present invention;

FIG.16 is a flow chart for explaining an

1 operation of a control part of the fifth embodiment;

FIG.17 is a system block diagram showing a  
sixth embodiment of the voice-dialing apparatus  
according to the present invention;

5 FIG.18 is a flow chart for explaining an  
operation of a control part of a seventh embodiment  
of the voice-dialing apparatus according to the  
present invention;

10 FIG.19 is a system block diagram showing an  
eighth embodiment of the voice-dialing apparatus  
according to the present invention;

FIG.20 is a system block diagram showing a  
ninth embodiment of the voice-dialing apparatus  
according to the present invention;

15 FIG.21 is a flow chart for explaining an  
operation of a control part of the ninth embodiment;

FIG.22 is a system block diagram showing a  
tenth embodiment of the voice-dialing apparatus  
according to the present invention;

20 FIG.23 is a flow chart for explaining an  
operation of a control part of the tenth embodiment;

FIG.24 is a system block diagram showing an  
eleventh embodiment of the voice-dialing apparatus  
according to the present invention;

25 FIG.25 is a flow chart for explaining an

1 operation of a control part of the eleventh  
embodiment;

FIG.26 is a flow chart for explaining a  
thirteenth embodiment of the voice-dialing apparatus  
5 according to the present invention;

FIG.27 is a flow chart for explaining a  
fourteenth embodiment of the voice-dialing apparatus  
according to the present invention; and

FIG.28 is a system block diagram showing a  
fifteenth embodiment of the voice-dialing apparatus  
10 according to the present invention.

FIG.2 shows a first embodiment of a  
voice-dialing apparatus according to the present  
invention. The voice-dialing apparatus has a handset  
15 21, a feature extraction part 22, a voice output  
(speech synthesis) part 23, a pattern matching part  
24, a first standard pattern storage part 25, a  
second standard pattern storage part 26, a dial  
circuit 27, a telephone number storage part 28, a  
20 control part 29, a keyboard 30, and a display part 31.

First, the user registers standard patterns  
(hereinafter referred to as key words) for voice  
recognition and response and telephone numbers  
corresponding to the standard patterns. When making  
25 the registration, it becomes convenient at the time

1 of a search when the key words and the telephone  
numbers are grouped because it is then possible to  
restrict a range of the search to within a group in  
which a desired registered data belongs. It will be  
5 assumed for convenience sake hereunder that the  
registration is made in groups.

As explained before in conjunction with the  
description of the conventional voice-dialing  
apparatus, the user may become unable to retrieve a  
desired one of the registered data, such as the case  
10 where the user forgets the key word of the desired  
registered data. In this case, the user instructs a  
search from the keyboard 30, and the control part 29  
searches the registered data in response to the  
15 search instruction and carries out a control so as to  
successively output the registered key words in the  
second standard pattern storage part 26 by voice  
(speech synthesis) through the voice output part 23.  
For example, the second standard pattern storage part  
20 26 stores identical key words as the first standard  
pattern storage part 25. In addition, the control  
part 29 reads the registered telephone numbers  
corresponding to each of the outputted registered key  
words from the telephone number storage part 28 and  
25 displays the telephone numbers on the display part 31.

1                   When the user knows the group in which the  
desired registered data (key word and corresponding  
telephone number) belongs, the search can be  
restricted to within the group by designating the  
5   group from the keyboard 30, for example. But when  
the user does not know the group in which the desired  
registered data belongs, the search is simply made  
with respect to all of the registered data.

10                  In this embodiment, the search instruction  
is entered from the keyboard 30, but the search  
instruction may be made by voice.

15                  The user designates the registered data  
when the output by voice and display is the desired  
registered data. When the user makes an erroneous  
designation, the user instructs by voice or from the  
keyboard 30 to disregard the designation and output  
the previous or next registered data. When the  
previous or next registered data is still not the  
desired registered data, such an operation of  
20   retrieving the previous or next registered data is  
repeated until the desired registered data is  
outputted. When the desired registered data is  
finally outputted, the user instructs the automatic  
dialing of the telephone number of the desired  
25   registered data through the dial circuit 27, that is,

1   the telephone number of the desired destination  
subscriber. Thus, according to this embodiment, the  
search for the desired registered data can be made  
with a satisfactory efficiency.

5                  The voice-dialing apparatus requires the  
registration of the key words by voice and the  
automatic dialing to the telephone number of the  
destination subscriber by the dial circuit 27 is  
carried out based on a result of a voice recognition  
10   in the pattern matching part 24 which recognizes the  
input voice obtained through the feature extraction  
part 22 by matching the input voice with the  
registered key words in the first standard pattern  
storage part 25. The result of the voice recognition  
15   is outputted by voice through the second standard  
pattern storage part 26 and the voice output part 23  
or displayed on the display part 31, so that the user  
may confirm the result of the voice recognition  
before the telephone call is actually made.

20                  The control part 29 of the first embodiment  
may be constituted by a microcomputer. FIG.3 is a  
flow chart for explaining the operation of the  
control part 29 of the first embodiment. A step S1  
discriminates whether or not an entry is made from  
25   the keyboard 30. When the discrimination result in

1 the step S1 becomes YES, a step S2 discriminates  
whether or not the entry from the keyboard 30  
instructs a search mode. The process advances to a  
step S3 to carry out the instructed operation other  
5 than the search when the discrimination result in the  
step S2 is NO. On the other hand, when the  
discrimination result in the step S2 is YES, a step  
S4 enters the data on the group (for example, group  
number) which is designated from the keyboard 30. A  
10 step S5 makes a search within the designated group,  
and a step S6 outputs by voice and display the data  
which are found by the search made within the  
designated group. A step S7 discriminates whether or  
not one of the outputted data is designated by the  
15 user, and a step S8 discriminates whether or not the  
all of the data within the designated group are  
outputted when the discrimination result in the step  
S7 is NO. The process is ended when the  
discrimination result in the step S8 is YES, but the  
20 process returns to the step S5 when the  
discrimination result in the step S8 is NO.

On the other hand, when the discrimination  
result in the step S7 is YES, a step S9 outputs the  
designated data by voice and display. Then, a step  
25 S10 discriminates whether or not there is an

1 instruction from the user to retrieve a previous data  
or a next data. When the discrimination result in  
the step S10 is YES, a step S11 outputs by voice and  
display the data prior or next to the data which is  
5 first outputted, and the process returns to the step  
S10. But when the discrimination result in the step  
S10 is NO, a step S12 carries out on the designated  
data a process which is instructed by the user.

However, especially when the number of  
10 registered data becomes large, the user tends to  
forget the key words for retrieving the registered  
data of subscribers which are not called frequently.

The search function is useful in such a case. The  
search may be started by designating a certain  
15 registration number from the user in the case where  
the user generally knows the registration numbers  
which are assigned to the registered data. For

example, the registration numbers are automatically  
assigned to the registered data by the voice-dialing  
20 apparatus in the sequence in which the data are  
registered. But the search may be made automatically  
by the voice-dialing apparatus, and in this case, the  
search is made in the sequence of the registration  
numbers. But in order to carry out the search with a  
25 satisfactory efficiency, that is, complete the search



1 within a short time, it is essential that the user  
2 designate the range to which the search is to be  
3 restricted. Otherwise, in a worst case, the search  
4 must be carried out with respect to all of the  
5 registered data until the desired registered data is  
6 found, and this is impractical.

7 FIG. 4 shows a second embodiment of the  
8 voice-dialing apparatus according to the present  
9 invention. In FIG. 4, those parts which are  
10 essentially the same as those corresponding parts in  
11 FIG. 2 are designated by the same reference numerals,  
12 and a description thereof will be omitted. This  
13 embodiment is designed so that the range of the  
14 search is automatically restricted based on an  
15 intermediate result which is obtained in a process of  
16 requesting confirmation from the user by voice, for  
17 example. The voice-dialing apparatus has the handset  
18 21, the feature extraction part 22, a voice response  
19 part 35, a dictionary pattern storage 36, a voice  
20 recognition part 37, a dial part 38, and a search  
21 part 39. The voice response part 35 includes a code  
22 sequence storage part 40, a digital-to-analog (D/A)  
23 converter 41, and a speech synthesis part 42. The  
24 voice recognition part 37 includes a preliminary  
25 selection part 43, a main selection part 44, and a

1 result output part 45. The dial part 38 includes a  
2 telephone number matching part 46 and a dial circuit  
3 47.

4 The voice entered from the handset 21 is  
5 analyzed into feature quantities in the feature  
6 extraction part 22 for recognition and response, and  
7 the extracted features are supplied to the voice  
8 response part 35 and the voice recognition part 37.  
9 The voice response part 35 stores a code sequence of  
10 the extracted features in the code sequence storage  
11 part 40, and the code sequence is successively  
12 converted into an analog signal in the D/A converter  
13 41. The analog signal from the D/A converter 41 is  
14 supplied to the speech synthesis part 42 which  
15 responds by voice (speech) through the handset 21.  
16 The voice recognition part 37 has the  
17 preliminary selection part 43 which makes a  
18 preliminary selection in conformance with a certain  
19 recognition method by use of a beginning portion or  
20 another portion of the voice data, as shown in  
21 FIGS. 5(A) through 5(C). FIG. 5(A) shows the voice  
22 power versus time characteristic for the case where  
23 the word is "STOP". FIG. 5(B) shows a signal which is  
24 obtained by determining a logic level thereof with  
25 reference to a predetermined threshold level TH, and

1 FIG.5(C) shows the sequence of the selection. By  
making the preliminary selection, it is possible to  
restrict the candidates of the word to within a  
predetermined range before the main selection is made  
5 in the main selection part 44. Thus, the preliminary  
selection and the main selection are made and the  
result of the main selection is outputted from the  
result output part 45 as shown in FIG.5(C). Any  
appropriate method may be employed to match the  
10 selections made in the preliminary selection part 43  
and the main selection part 44, and there is no  
restriction on the method to be employed.

When making a search, the voice-dialing  
apparatus seeks the user's instruction by voice. The  
15 search is instructed by the user when the user  
forgets the key word for retrieving the desired  
registered data or when the entered key word cannot  
be recognized for some reason. Hence, when  
retrieving the registered data on Mr. S. Tanaka, for  
20 example, the user may not know whether the key word  
is "Mr. Tanaka, S." or "Mr. Tanaka, Section Head" and  
for this reason the user simply enters "Mr. Tanaka,  
---". When the preliminary selection is made based  
on this entry "Mr. Tanaka, ---", all of the  
25 registered data under the name starting with "Mr.

1 "Ta---" will be selected. Hence, when these  
registered data under the similar names starting with  
"Mr. Ta---" are outputted by voice or displayed in  
the sequence with the greatest similarity to the name  
5 "Mr. Tanaka", the user can find the desired  
registered data from the restricted registered data  
selected by the preliminary selection. As a result,  
the desired registered data can be found with a high  
efficiency and with considerably less burden on the  
10 user when compared to the case where the user must  
select the desired registered data from all of the  
registered data.

The preliminary selection part 43 restricts  
the registered data from which the selection is to be  
15 made to approximately 1/3 to 1/5 the total registered  
data. Accordingly, the main selection part 44 makes  
the actual selection from the registered data which  
are automatically restricted to approximately 1/3 to  
1/5 the total registered data.

20 The second embodiment shown in FIG.4 may  
have the construction shown in FIG.2. In this case,  
the voice response part 35 corresponds to the voice  
output part 23, and the dictionary pattern storage 36  
corresponds to the storages 25, 26 and 28. The voice  
25 recognition part 37 corresponds to the pattern

1 matching part 24 and the control part 29, and the  
dial part 38 corresponds to the dial circuit 27 and  
the control part 29. The search part 39 corresponds  
to the control part 29. The telephone number storage  
28 may be a part of the telephone number matching  
part 46. The control part 29 may be constituted by a  
microcomputer, and FIGS. 6A and 6B are flow charts for  
explaining the operation of the control part 29 in  
the case of the second embodiment.

10 FIG. 6A shows one embodiment of the  
operation of the control part 29 in the case of the  
second embodiment. In FIG. 6A, a step S21 reads the  
key word which is entered by the user, and this key  
word may be unclear due to a change in the user's  
15 voice or the like. A step S22 carries out a  
preliminary selection to select those registered data  
having a relatively high probability that they are  
the registered data of the entered key word. A step  
S23 successively outputs by voice and display the  
20 registered data which are selected by the preliminary  
selection. Then, a step S24 enters one of the  
outputted registered data which is designated by the  
user. It is possible to thereafter advance the  
process to a step such as the step S9 shown in FIG. 3  
25 described before.

1 FIG. 6B shows another embodiment of the  
operation of the control part 29 in the case of the  
second embodiment. In FIG. 6B, those parts which are  
the same as those corresponding parts in FIG. 6A are  
designated by the same reference numerals, and a  
5 description thereof will be omitted. In FIG. 6B, a  
step S25 is carried out in place of the step S23  
shown in FIG. 6A. The step S25 successively outputs  
by voice and display the registered data which are  
selected by the preliminary selection in a sequence  
10 of the greatest similarity to the entered key word.

On the other hand, the voice-dialing  
apparatus registers only one telephone number with  
respect to one key word, that is, one destination  
subscriber. Hence, in the case where the destination  
15 subscriber has a plurality of telephone numbers but  
the line is busy when the telephone call is made  
responsive to the key word corresponding to a first  
telephone number, the user must once hang up manually  
and call again later using the same key word or make  
20 another call using another key word corresponding to  
a second telephone number. Thus, when it is only  
possible to register one telephone number with  
respect to one registered key word, it is both  
troublesome and time consuming for the user to find a  
25

1 line which is not busy, especially when the user  
wishes to use the telephone call on urgent matters  
and when one or more telephone numbers of the  
destination subscriber is in use for a long period of  
5 time. Hence, a description will now be given of an  
embodiment which eliminates these problems.

FIG.7 shows a third embodiment of the  
voice-dialing apparatus according to the present  
invention. In FIG.7, those parts which are  
10 essentially the same as those corresponding parts in  
FIG.2 are designated by the same reference numerals.

According to this embodiment, it is possible to  
register a plurality of telephone numbers with  
respect to one key word, that is, one destination  
15 subscriber. Furthermore, when the line is busy for  
one telephone number of the destination subscriber,  
the line is automatically disconnected and an  
automatic dialing is carried out for another  
telephone number of the same destination subscriber.  
20 The operation of automatically disconnecting from the  
first telephone number of the destination subscriber  
and automatically dialing a second telephone number  
of the same destination subscriber may be repeated  
until the destination subscriber is reached.

25 In FIG.7, the voice-dialing apparatus has a

1 transmitter 51, a telephone receiver 52, a channel  
circuit 53, the feature extracting part 22, the  
standard pattern storage 26 for speech synthesis, the  
voice output (speech synthesis) part 23, a connection  
5 control part 54, the control part 29, the standard  
pattern storage 25 for voice recognition, the pattern  
matching part 24, a state detector 55, the keyboard  
30, a timer 58, the number storage part 28, the dial  
circuit 27, and a line control part 56 coupled to  
10 lines 57. The transmitter 51 and the telephone  
receiver 52 constitute the handset 21.

The feature quantity of the voice entered  
from the transmitter 51 is extracted in the feature  
15 extraction part 22. The control part 29 determines  
depending on a state of the keyboard 30 whether the  
extracted feature quantity is to be used as the  
standard pattern for recognition or the standard  
pattern for speech synthesis and also whether or not  
to carry out the pattern matching. When a standard  
20 pattern (key word) register button of the keyboard 30  
is pushed, the speech synthesis part 23 outputs a  
registration guidance by voice through the telephone  
receiver 52. Such a registration guidance is  
registered in advance so as to guide the user in  
25 entering instructions related to the registration of

1 data by voice. Thereafter, the feature of the user's  
voice is extracted in the feature extraction part 22  
and the extracted feature quantity is registered in  
the standard pattern storage 25 as the standard  
pattern for recognition and in the standard pattern  
storage 26 as the standard pattern for speech  
synthesis. In this state, when there exist a  
plurality of telephone numbers which are to be  
registered under the entered key word, the telephone  
numbers are stored in the telephone number storage  
part 28 from the keyboard 30 in a sequence of a  
frequency with which these telephone numbers are used  
(hereinafter simply referred to as a frequency of  
use) or in a sequence which is most convenient for  
the user.

15 The control part 29 may be constituted by a  
microcomputer, and FIG. 8 shows a flow chart for  
explaining the operation of the control part 29 when  
registering the data in this third embodiment. A  
20 step S31 enters the instruction from the standard  
pattern (key word) register button. In other words,  
no instruction is received when the standard pattern  
register button is not pushed. When the instruction  
from the standard pattern register key is received, a  
25 step S32 outputs a registration guidance requesting

1 the user to enter the telephone number of the  
destination subscriber. A step S33 enters the  
telephone number of the destination subscriber  
entered by the user from the keyboard 30, for  
example, and a step S34 outputs a registration  
5 guidance requesting the user to enter the key word  
for the destination subscriber. A step S35 enters  
the key word entered by the user by voice, and a step  
S36 outputs by voice or display the telephone number  
10 which will be registered for confirmation by the  
user. A step S36 discriminates whether or not there  
exist a plurality of telephone numbers to be  
registered under the same destination subscriber (key  
word). When the discrimination result in the step  
15 S37 is YES, a step S38 enters the next telephone  
number of the same destination subscriber, and the  
process returns to the step S36. On the other hand,  
when the discrimination result in the step S37 is NO,  
a step S39 discriminates whether or not the telephone  
20 number of another destination subscriber is to be  
registered. The process is ended when the  
discrimination result in the step S39 is NO, but the  
process returns to the step S31 when the  
discrimination result in the step S39 is YES.  
25 Next, a description will be given of the

1 operation of the voice-dialing apparatus at the time  
of a recognition. In a state where the standard  
pattern (key word) register button of the keyboard 30  
is not pushed, a dialing guidance similar to the  
5 registration guidance described above is outputted to  
the user to seek the user's instruction related to  
the voice-dialing. When the user enters the  
instruction by voice, the feature of the key word is  
extracted in the feature extraction part 22. The  
10 extracted feature quantity is supplied to the pattern  
matching part 24 wherein the extracted feature  
quantity is subjected to a pattern matching with the  
standard patterns for recognition stored in the  
standard pattern storage 25. The pattern matching  
15 part 24 outputs as the recognition result a feature  
quantity having a highest similarity to the extracted  
feature quantity. This recognition result is  
supplied to the control part 29. When a plurality of  
telephone numbers are stored in the telephone number  
20 storage 28 with respect to the recognition result,  
the control part 29 automatically reads one of the  
telephone numbers. For example, the telephone  
numbers are read out from the telephone number  
storage 28 in the sequence of the highest frequency  
25 of use. The selected telephone number is supplied to

the dial circuit 27, and the dialing is automatically  
made to the desired destination subscriber through  
the line control part 56. The recognition result  
from the pattern matching part 24 is also supplied to  
5 the speech synthesis part 23 and the corresponding  
key word is outputted to the user through the  
telephone receiver 52 so that the user may confirm  
the desired destination subscriber.

Next, when the first dialed telephone  
10 number is detected as being busy in the state  
detector 55, the dialing is automatically stopped and  
the line is once disconnected by the line control  
part 56. The control part 29 then reads out another  
telephone number from the telephone number storage 28  
15 and supplies the selected telephone number to the  
dial circuit 27, so as to automatically make the  
dialing to the desired destination subscriber through  
the line control part 56. For example, this other  
telephone number which is read has the second highest  
20 frequency of use. Such an operation is repeated  
until the destination subscriber is reached, unless  
the user disconnects the line manually. Hence, the  
telephone numbers registered under the same key word  
are successively selected in the sequence of the  
25 highest frequency of use, for example, until a

1 non-busy line is dialed and the desired destination  
subscriber is reached. The successive selection of  
the registered telephone numbers may also be made in  
the sequence of the largest number, for example. In  
5 addition, when a plurality of telephone numbers are  
registered under the same key word, it is possible to  
take measures so that the order (or arrangement) of  
the telephone numbers are automatically rearranged  
depending on the frequency of use.

10 FIG.9 shows a flow chart for explaining the  
operation of the control part 29 when making an  
automatic dialing in this third embodiment. A step  
S41 outputs a dialing guidance to seek the user's  
instruction related to the voice-dialing. A step S42  
15 reads the key word entered by the user by voice, and  
a step S43 outputs the recognized result to the user  
for confirmation. Here, it is assumed for  
convenience sake that the recognized result is  
correct and the user confirms the correct recognition  
20 result. Then a step S44 dials the telephone number  
of the destination subscriber which is recognized  
from the key word. A step S45 discriminates whether  
or not the line is busy, and the call is made when  
the discrimination result in the step S45 is NO. But  
25 when the discrimination result in the step S45 is

1 YES, a step S46 discriminates whether or not another  
telephone number of the same destination subscriber  
should be dialed automatically. In other words, when  
the user hangs up manually, the discrimination result  
5 in the step S46 is NO. On the other hand, when the  
user does not hang up, the voice-dialing apparatus  
automatically enters the sequence of dialing another  
telephone number of the same destination subscriber.  
When the discrimination result in the step S46 is  
10 YES, a step S47 selects another telephone number  
registered under the same destination subscriber, and  
the process returns to the step S44.

According to this embodiment, it is  
possible for the user to register a plurality of  
15 telephone numbers with respect to one destination  
subscriber. If the line is busy when one of the  
telephone numbers registered under a key word is  
automatically selected and dialed, another telephone  
number registered under the same key word is  
20 automatically selected and dialed and such an  
operation is repeated until the destination  
subscriber is reached. As a result, even when the  
line is busy, there is no need for the user to carry  
out the troublesome operation of hanging up manually  
25 to dial the same number again or dial another

1 telephone number of the destination subscriber.  
furthermore, the function of automatically selecting  
the telephone numbers registered under the same key  
word until a non-busy line is dialed and the desired  
5 destination subscriber is reached is especially  
effective when one or more lines of the destination  
subscriber is busy and the user needs to reach the  
destination subscriber in a hurry.

FIG.10 shows a fourth embodiment of the  
10 voice-dialing apparatus according to the present  
invention. In FIG.10, those parts which are  
essentially the same as those corresponding parts in  
FIGS.2 and 7 are designated by the same reference  
numerals, and a description thereof will be omitted.  
15 The voice-dialing apparatus has a voice recognition  
part 61, the speech synthesis part 23, a data storage  
63, a dialing part 64, the keyboard 30, the display  
part 31, and the handset 21. The voice recognition  
part 61 corresponds to the feature extraction part 22  
20 and the pattern matching part 24. The dialing part  
64 corresponds to the control part 29 and the dial  
circuit 27. The data storage 63 corresponds to the  
storages 25, 26 and 28.

25 When the user enters the key word for  
retrieving the registered data on a desired

1 destination subscriber, the key word is recognized  
and the corresponding registered telephone number is  
retrieved, and the telephone number of the desired  
destination subscriber is automatically dialed by the  
5 dialing part 64 to connect thereto through a  
subscriber line 68. In addition, the data on the  
voice recognition rate and the frequency of use of  
the dialed telephone number are calculated, and such  
data are stored in the data storage 63.

10 The voice recognition part 61 has a voice  
recognition circuit and carries out operations such  
as extracting voice data from the voice entered from  
the handset 21, storing the voice data in the data  
storage 63, comparing the voice data from the handset  
21 and the voice data stored in the data storage 63,  
15 and recognizing the destination subscriber which is  
designated by the voice (key word).

As shown in FIG.11, the data storage 63 has  
a plurality of descriptors 69 and a message data area  
74 in which the voice message data are stored. The  
20 descriptor 69 has a voice data area 70 for storing  
the voice data indicating each destination  
subscriber, a dial number area 71 in which the  
telephone numbers of the destination subscriber  
corresponding to the voice data is stored, a



1 frequency of use descriptive area 72 in which the  
frequency of use of the telephone number stored in  
the dial number area 71 is written, and a recognition  
rate descriptive area 73 in which the recognition  
rate of the voice data stored in the audio data area  
70 is written. The contents of the areas 70 through  
73 are rewritten when necessary.

15 In addition, the speech synthesis part 23  
has a speech synthesis circuit and makes access to  
the message data area 74 of the data storage 63 so as  
to extract a voice message data based on a control  
signal from the dialing part 64. The speech  
synthesis part 23 outputs the message voice through  
the handset 21 by speech synthesis. When an  
answerback instruction and a destination subscriber  
data are supplied from the voice recognition part 61,  
the speech synthesis part 23 makes access to each  
descriptor 69 of the data storage 63 so as to extract  
the voice data based on the destination subscriber  
data. Hence, the subscriber name (or key word) is  
outputted through the handset 21 by speech synthesis.

FIG.12 shows an arrangement of keys of the  
keyboard 30 together with the display part. 31. The  
keyboard 30 generally has a ten key 75, a register  
key 76, a search key 77, a delete key 78, a renew key

1 79, a voice dial key 80, and a cancel key 81. When  
one of the keys of the keyboard 30 is pushed, a  
corresponding key code signal is generated and  
supplied to the dialing part 64.

5 The display part 31 is made of a liquid  
crystal display unit or the like. When a display  
data is received from the dialing part 64, the  
display part 31 displays the display data thereon.

10 The dialing part 64 has a register mode, a  
recognition mode, a delete mode, a search mode, and a  
renew mode. The dialing part 64 is set to one of  
these modes and controls other parts of the  
voice-dialing apparatus when a corresponding one of  
the register key 76, the voice dial key 80, the  
delete key 78, the search key 77, and the renew key  
79 is pushed.

15 In the case where the register mode is  
selected by pushing the register key 76, the dialing  
part 64 controls the speech synthesis part 23 so as  
to output a predetermined guidance by voice through  
the handset 21. The predetermined guidance requests  
the user to enter the telephone number of the  
destination subscriber from the keyboard 30 and to  
enter the name (key word) of the destination  
subscriber. Thus, the user makes the requested

1 entry. At the same time, the dialing part 64 selects  
an empty descriptor 69 in the data storage 63 and  
stores the telephone number and the voice data on the  
destination subscriber into this empty descriptor  
5 69. In addition, the frequency of use is set to "0"  
in the descriptive area 72 of this descriptor 69 and  
the recognition rate is set to "0" in the descriptive  
area 73 of this descriptor 69.

On the other hand, when the recognition  
10 mode is selected by pushing the voice dial key 80,  
the dialing part 64 controls the voice recognition  
part 61 so as to carry out a matching of the name  
(key word) of the destination subscriber entered from  
the handset 21 and the voice data registered in the  
15 data storage part 63 and recognize the name (key  
word) entered from the handset 21. Thereafter, the  
dialing part 64 controls the speech synthesis part 23  
to output the recognized name (key word) through the  
handset 21 by speech synthesis. In other words, an  
20 answerback is made so that the user may confirm the  
result of the recognition.

When the result of the recognition is  
correct, the user enters a message to confirm by  
voice through the handset 21 or from the keyboard  
25 30. The dialing part 64 reads out the telephone

1 number corresponding to the recognized name (key  
word) from the data storage 63 when a confirmation is  
received from the user, and the dialing part 64  
automatically dials to this telephone number thereby  
5 connecting the handset 21 to the subscriber line 68.  
When reading out the telephone number from the data  
storage 63, the dialing part 64 increments by one the  
value of the frequency of use stored in the  
descriptive area 72 of the descriptor 69 in which  
10 this telephone number is stored and the value of the  
recognition rate stored in the descriptive area 73 of  
the descriptor 69 in which this telephone number is  
stored.

On the other hand, when the result of the  
15 recognition is incorrect and an incorrect answerback  
is received, the user enters a message to indicate by  
voice through the handset 21 or from the keyboard 30  
that the recognition is incorrect. In this case, the  
dialing part 64 controls the speech synthesis part 23  
20 so as to again output a guidance requesting the user  
to enter the name (key word) of the destination  
subscriber. When the user thereafter enters the name  
(key word) of the destination subscriber by voice,  
the dialing part 64 controls the voice recognition  
25 part 61 so as to carry out a matching of the name

1 (key word) of the destination subscriber entered from  
the handset 21 and the voice data registered in the  
data storage part 63 and recognize the name (key  
word) entered from the handset 21. Thereafter, the  
5 dialing part 64 controls the speech synthesis part 23  
to output the recognized name (key word) through the  
handset 21 by speech synthesis. In other words, an  
answerback is made so that the user may confirm the  
result of the recognition.

10 When the result of the recognition made for  
the second time is correct, the user enters a message  
to confirm by voice through the handset 21 or from  
the keyboard 30. The dialing part 64 reads out the  
telephone number corresponding to the recognized name  
15 (key word) from the data storage 63 when a  
confirmation is received from the user, and the  
dialing part 64 automatically dials to this telephone  
number thereby connecting the handset 21 to the  
subscriber line 68. When reading out the telephone  
20 number from the data storage 63, the dialing part 64  
increments by one the value of the frequency of use  
stored in the descriptive area 72 of the descriptor  
69 in which this telephone number is stored, however,  
the dialing part 64 does not increment the value of  
25 the recognition rate stored in the descriptive area

1 73 of the descriptor 69 in which this telephone  
number is stored because the name (key word) was not  
correctly recognized the first time.

FIG.13 is a flow chart for explaining an  
5 operation of the control part 29 (that is, a part of  
the dialing part 64) of the fourth embodiment in the  
recognition mode. A step S51 makes a voice  
recognition of the voice entry made by the user, and  
a step S52 outputs the recognized result (key word)  
10 for confirmation by the user. A step S53  
discriminates whether or not the user confirms the  
recognized result as being correct. When the  
recognized result is incorrect and the discrimination  
result in the step S53 is NO, the process returns to  
15 the step S51. On the other hand, when the  
discrimination result in the step S53 is YES, a step  
S54 automatically dials the telephone number of the  
recognized destination subscriber (key word). In  
addition, a step S55 increments by one the frequency  
20 of use of the destination subscriber.

In the case where the delete mode is  
selected by pushing the delete key 78, the dialing  
part 64 controls the speech synthesis part 23 so as  
to output a predetermined guidance by voice  
25 confirming whether or not the user wishes to make a

1 search in carrying out the deletion of the registered  
data. When the user enters a message requesting no  
search by voice through the handset 21 or from the  
keyboard 30, the dialing part 64 controls the speech  
synthesis part 23 so as to output a predetermined  
5 guidance requesting the user to enter the name (key  
word) of the registered destination subscriber which  
is to be deleted. The dialing part 64 also controls  
the voice recognition part 61 to recognize the  
10 destination subscriber, and the content of the  
descriptor 69 corresponding to the recognized  
subscriber is deleted from the data storage 63.

On the other hand, when the user enters a  
message requesting a search in the delete mode, the  
15 dialing part 64 successively reads out the frequency  
of use stored in the descriptive area 72 of each  
descriptor 69 in the data storage 63 and sorts  
(rearranges) the frequency of use in the sequence of  
the lowest frequency. The dialing part 64 thereafter  
20 controls the speech synthesis part 23 to select and  
output through the handset 21 by speech synthesis the  
name (key word) of the destination subscriber having  
the lowest frequency of use. Moreover, this  
frequency of use is also displayed on the display  
25 part 31. When the user pushes the delete key 78 in

this state, the dialing part 64 erases the descriptor  
69 of the destination subscriber which is selected at  
that time. On the other hand, when the user pushes a  
next candidate key (not shown) of the keyboard 30,  
the dialing part 64 selects and outputs through the  
handset 21 by speech synthesis the name (key word) of  
the destination subscriber having the second lowest  
frequency of use, and this name (key word) is also  
displayed on the display part 31. The search for the  
desired registered data which is to be deleted may be  
carried out similarly thereafter. When the desired  
deletion is completed and the cancel key 81 is  
pushed, the dialing part 64 ends the delete mode.

FIG.14 is a flow chart for explaining an  
operation of the control part 29 (that is, a part of  
the dialing part 64) of the fourth embodiment in the  
delete mode. A step S61 discriminates whether or not  
a search is to be carried out. When the  
discrimination result in the step S61 is YES, a step  
S62 discriminates whether or not all of the  
registered destination subscribers have been  
outputted. When the discrimination result in the  
step S62 is NO, a step S63 outputs a destination  
subscriber (key word) which has not yet been  
outputted and has the lowest frequency of use among

1 those destination subscribers which have not yet been  
outputted. A step S64 discriminates whether or not  
to delete the destination subscriber which is  
outputted based on an instruction entered by the  
user. A step S65 deletes the destination subscriber  
(and the corresponding telephone number) when the  
discrimination result in the step S64 is YES, and the  
process advances to a step S66. But when the  
discrimination result in the step S64 is NO, the  
process jumps to the step S66. The step S66  
discriminates whether or not to end the delete mode.  
The process returns to the step S62 when the  
discrimination result in the step S66 is NO. The  
process is ended when the discrimination result in  
the step S62 or S66 is YES.

On the other hand, when the discrimination  
result in the step S68 is NO, a step S68 makes a  
voice recognition of the voice entry. A step S69  
outputs the name (key word) of the recognized  
destination subscriber, and a step S70 discriminates  
whether or not the user confirms the recognized  
result as being correct. When the recognized result  
is correct and the discrimination result in the step  
S53 is YES, a step S71 deletes the destination  
subscriber (and the corresponding telephone number),

1 and the process advances to a step S72. But when the  
discrimination result in the step S70 is NO, the  
process jumps to the step S72. The step S72  
discriminates whether or not to end the delete mode,  
and the process returns to the step S68 when the  
discrimination result in the step S72 is NO. On the  
other hand, the process is ended when the  
discrimination result in the step S72 is YES.

A renew mode is selected when the renew key  
79 is pushed. In this case, the dialing part 64  
controls the speech synthesis part 23 so as to output  
a predetermined guidance which confirms whether or  
not the user wishes to make a search for renewing the  
registered data. When the user enters a message  
requesting no search by voice through the handset 21  
or from the keyboard 30, the dialing part 64 controls  
the speech synthesis part 23 so as to output a  
predetermined guidance requesting the user to enter  
the name (key word) of the registered destination  
subscriber which is to be renewed. The dialing part  
64 also controls the voice recognition part 61 to  
recognize the destination subscriber, and the content  
of the voice data area 70 in the descriptor 69 and  
corresponding to the recognized subscriber is renewed.

On the other hand, when the user enters a

1 message requesting a search in the renew mode, the  
dialing part 64 successively reads out the frequency  
of use stored in the descriptive area 72 of each  
descriptor 69 and the recognition rate stored in the  
5 descriptive area 73 of each descriptor 69 in the data  
storage 63. Furthermore, the dialing part 64  
calculates the correct recognition rate for each  
destination subscriber based on the frequency of use,  
the recognition rate, and the following formula,  
10 where the correct recognition rate is the rate with  
which the recognition is made correctly.

$$\begin{aligned} & (\text{Correct Recognition Rate}) \\ & = (\text{Recognition Rate}) / (\text{Frequency of Use}) \end{aligned}$$

15 The dialing part 64 thereafter sorts the  
calculated correct recognition rates in the sequence  
of the lowest value. Then, the dialing part 64  
controls the speech synthesis part 23 to select and  
output through the handset 21 by speech synthesis the  
name (key word) of the destination subscriber having  
20 the lowest correct recognition rate. Moreover, this  
correct recognition rate is also displayed on the  
display part 31. When the user pushes the renew key  
79 in this state, the dialing part 64 controls the  
speech synthesis part 23 to output through the  
25 handset 21 by speech synthesis a predetermined

1 guidance which requests the user to enter the name  
(key word) of the destination subscriber which is  
selected at that time. Hence, the dialing part 64  
renews the content of the voice data area 70 of the  
5 descriptor 69 of the destination subscriber which is  
selected at that time.

On the other hand, when the user pushes the  
next candidate key of the keyboard 30, the dialing  
part 64 selects and outputs through the handset 21 by  
10 speech synthesis the name (key word) of the  
destination subscriber having the second lowest  
correct recognition rate, and this name (key word) is  
also displayed on the display part 31. The search  
for the desired registered data which is to be  
renewed may be carried out similarly thereafter.  
When the desired renewal is completed and the cancel  
key 81 is pushed, the dialing part 64 ends the renew  
mode.

Therefore, according to this embodiment, it  
is possible to automatically extract by use of the  
search function those destination subscribers having  
a low frequency of use and those destination  
subscribers having a low correct recognition rate.  
Thus, it is possible to accurately carry out the  
25 operations of adding destination subscribers and

1 renew voice data of destination subscribers. In  
addition, since the recognition rate and the  
frequency of use are displayed when the search is  
requested in the renew mode, it is possible to  
discontinue the renewal registration when the  
frequency of use is low even when the correct  
recognition rate is small.

Next, a description will be given of a  
fifth embodiment of the voice-dialing apparatus  
according to the present invention, by referring to  
FIG.15. In FIG.15, those parts which are essentially  
the same as those corresponding parts in FIGS.2 and 7  
are designated by the same reference numerals, and a  
description thereof will be omitted.

First, a description will be given of the  
operation of the fifth embodiment in the register  
mode. When making a general registration of the  
data, the user instructs the registration mode from  
the keyboard 30. When the control part 29 receives  
this instruction from the keyboard 31, the control  
part 29 controls the display part 31 so as to display  
a message requesting the user to enter the telephone  
number of the destination subscriber to be  
registered. This embodiment enters the instruction  
from the keyboard 30 and displays the message on the

1 display part 31, but it is of course possible to  
enter the instruction by voice through the handset 21  
and also output the message by voice through the  
handset 21.

The user enters the telephone number of the  
destination subscriber to be registered in accordance  
with the message displayed on the display part 31.  
The entered telephone number is stored in the  
telephone number storage 28. Thereafter, the control  
part 29 controls the display part 31 so as to display  
a message requesting the user to enter by voice the  
name (key word) of the destination subscriber to be  
registered. When the user enters the key word by  
voice through the handset 21, the feature quantity of  
the key word is extracted in the feature extraction  
part 22 and the standard pattern for recognition and  
the standard pattern for response are respectively  
stored in the standard pattern storages 25 and 26.

Next, a description will be given of the  
operation of the fifth embodiment in the dialing  
mode. In the dialing mode, the dial circuit 27  
outputs a signal on the line and also outputs the  
telephone number to a telephone number storage 90.  
This telephone number storage 90 stores the telephone  
number which is dialed last. Hence, this last dialed

1 telephone number stored in the telephone number  
storage 90 may be registered similarly as in the case  
of the register mode.

5 In other words, when the user wishes to  
register the last dialed telephone number, the user  
instructs the register mode from the keyboard 30.  
When the control part 29 receives this instruction  
from the keyboard 31, the control part 29 controls  
the display part 31 so as to display a message  
requesting the user to enter the telephone number of  
the destination subscriber to be registered. In this  
case, the user instructs the voice-dialing apparatus  
from the keyboard 30 to read out the last dialed  
telephone number stored in the telephone number  
15 storage 90. The control part 29 reads the last  
dialed telephone number from the telephone number  
storage 90, and stores and registers this telephone  
number in the telephone number storage 28.

20 Thereafter, the key word is entered similarly as in  
the case of the general register mode described above.

In this embodiment, it is of course  
possible to omit the telephone number storage 90 and  
use a portion of the telephone number storage 28 for  
temporarily storing the last dialed telephone  
25 number. If there is no instruction to register the

1 last dialed telephone number, the content of the  
telephone number storage 90 is erased and rewritten  
by a telephone number which is dialed.

FIG.16 shows a flow chart for explaining  
the operation of the control part 29 of the fifth  
embodiment. A step S81 supervises a manual dialing,  
and a step S82 detects an end of the call. A step  
S83 detects the instruction from the user to set the  
mode of the voice-dialing apparatus to the register  
mode, and a step S84 outputs the message requesting  
the user to enter the telephone number to be  
registered. A step S85 detects the instruction from  
the user to register the last dialed telephone number  
stored in the telephone number storage 90. A step  
S85 reads out the last dialed telephone number from  
the telephone number storage 90 and registers the  
same in the telephone number storage 28. A step S87  
outputs the message requesting the user to enter the  
name (key word) of the destination subscriber the  
telephone number of which is now being registered,  
and a step S88 detects and registers the key word  
entered by the user.

Next, a description will be given of a  
sixth embodiment of the voice-dialing apparatus  
according to the present invention, by referring to



1 FIG.17. In FIG.17, those parts which are essentially  
the same as those corresponding parts in FIGS.2 and 7  
are designated by the same reference numerals, and a  
description thereof will be omitted. This embodiment  
is provided with an area code editing part 92. The  
5 area code editing part 92 is shown in FIG.17 as  
having an area code selection part 92a and an area  
code discrimination part 92b, but it is not essential  
to provide both the parts 92a and 92b. In other  
10 words, the area code editing part 92 may be made up  
of the area code selection part 92a and/or the area  
code discrimination part 92b.

First, a description will be given of the  
case where the area code editing part 92 is made up  
15 solely of the area code selection part 92a. When an  
area code is designated by the user, the area code  
selection part 92a selects the registered telephone  
numbers which are stored in the telephone number  
storage 28 and have the designated area code. Hence,  
20 it is possible to delete the designated area code  
from all of the registered telephone numbers selected  
by the area code selection part 92a.

It is assumed in FIG.17 that the telephone  
numbers corresponding to the standard pattern for  
25 voice recognition and response are already registered

1 in the telephone number storage 28. For example,  
when the user moves from a first region (for example,  
Tokyo) having a first area code (for example, "03")  
to a second region (for example, Yokohama) having a  
5 second area code (for example, "045") and takes the  
telephone with him, the telephone number of a friend  
living in the second region is already registered  
together with the second area code. But when dialing  
this friend within the second region, there is no  
10 need to dial the second area code. Hence, in this  
case, the user instructs the control part 29 from the  
keyboard 30 to delete the second area code from all  
of the registered telephone numbers having the second  
area code. The control part 29 controls the area  
15 code selection part 92a to select those registered  
telephone numbers which are stored in the telephone  
number storage 28 and have the second area code. In  
addition, the control part 29 deletes the second area  
code from all of the registered telephone numbers  
20 selected by the area code selection part 92a and  
re-registers all of these telephone numbers in the  
telephone number storage 28 in one operation but  
without the second area code.

Next, a description will be given of the  
case where the area code editing part 92 is made up

1 solely of the area code discrimination part 92b. The  
 area code discrimination part 92b discriminates  
 whether or not the telephone numbers registered in  
 the telephone number storage 28 have area codes. By  
 5 selecting the registered telephone numbers without  
 the area code, it is possible to add a predetermined  
 area code to all of these selected telephone numbers.

When the user moves from the first region  
 to the second region as described above, the  
 10 telephone number of a friend living in the first  
 region is registered without the first area code.

But when dialing this friend from the second region,  
 there is a need to dial the first area code. Hence,  
 in this case, the user instructs the control part 29  
 15 from the keyboard 30 to add (or insert) the first  
 area code to all of the registered telephone numbers  
 not having an area code. The control part 29

controls the area code discrimination part 92b to  
 select those registered telephone numbers which are  
 20 stored in the telephone number storage 28 and do not  
 have the area code. In addition, the control part 29  
 adds the first area code to all of the registered  
 telephone numbers selected by the area code

discrimination part 92b and re-registers all of these  
 25 telephone numbers in the telephone number storage 28

1 in one operation but with the first area code added  
 thereto.

When the area code editing part 92 is made  
 up of both the area code selection part 92a and the  
 5 area code discrimination part 92b, it is evident that  
 it is possible to delete a certain area code from all  
 of the registered telephone numbers having the  
 certain area code and also add an area code to all of  
 the registered telephone numbers not having an area  
 10 code, both in one operation.

Next, a description will be given of a  
 seventh embodiment of the voice-dialing apparatus  
 according to the present invention, by referring to  
 FIG.10 since the block system is the same as that of  
 15 the fourth embodiment described before. In this  
 seventh embodiment, when a telephone number is dialed  
 manually from the keys, a check is made to determine  
 whether or not this telephone number is already  
 registered for enabling the voice-dialing. When it  
 is determined that this telephone number is not yet  
 20 registered, the name (key word) of the destination  
 subscriber is entered by voice so that the necessary  
 information on this destination subscriber is  
 registered.

As described before in conjunction with

1 FIG.11, the data storage 63 has the plurality of  
descriptors 69 and the message data area 74 in which  
the voice message data are stored. The descriptor 69  
has at least the voice data area 70 for storing the  
voice data indicating each destination subscriber,  
and the dial number area 71 in which the telephone  
number of the destination subscriber corresponding to  
the voice data is stored. The contents of the areas  
70 and 71 are rewritten when necessary.

10 The keyboard 30 has the construction  
described before in conjunction with FIG.12.

The dialing part 64 has a main register  
mode, an auxiliary register mode, the recognition  
mode, the delete mode, the search mode, and the renew  
mode. The dialing part 64 is set to one of these  
modes and controls other parts of the voice-dialing  
apparatus when a corresponding one of the register  
key 76, the voice dial key 80, the delete key 78, the  
search key 77, and the renew key 79 shown in FIG.12  
is pushed.

20 In the case where the main register mode is  
selected by pushing the register key 76, the dialing  
part 64 controls the speech synthesis part 23 so as  
to output a predetermined guidance by voice through  
the handset 21. The predetermined guidance requests

1 the user to enter the telephone number of the  
destination subscriber from the keyboard 30 and to  
enter the name (key word) of the destination  
subscriber. Thus, the user makes the requested  
entry. At the same time, the dialing part 64 selects  
an empty descriptor 69 in the data storage 63 and  
stores the telephone number and the voice data on the  
destination subscriber into this empty descriptor 69.

10 On the other hand, the auxiliary register  
mode is selected by pushing the register key 76 in  
combination with another predetermined key when no  
key is provided exclusively for selecting the  
auxiliary register mode or by pushing an auxiliary  
register key (not shown) when the auxiliary register  
key is provided exclusively for selecting the  
auxiliary register mode. In this case, the dialing  
part 64 (that is, a control part) carries out the  
process according to a flow chart shown in FIG.18.

20 In FIG.18, a step ST1 discriminates whether  
or not a call is to be started. A step ST2  
discriminates whether or not a voice-dialing is to be  
made when the discrimination result in the step ST1  
becomes YES. When the discrimination result in the  
step ST2 is YES, a step ST10 makes the voice-dialing  
in response to the key word entered by voice and the

1 process is ended. However, when the discrimination  
result in the step ST2 is NO and a dialing is to be  
made manually from the keyboard 30, a step ST3 reads  
a key code entered from the keyboard 30 and dials a  
5 telephone number described by the key code. Then a  
step ST4 discriminates whether or not an automatic  
register key (not shown) is pushed. Instead of  
providing this automatic register key, it is also  
possible to set the mode to the automatic register  
10 mode by pushing the register key 76 in combination  
with another key. The process is ended when the  
discrimination result in the step ST4 is NO.

But when the discrimination result in the

15 step ST4 is YES, a step ST5 discriminates whether or  
not the dialed telephone number is already  
registered. The process is ended when the  
discrimination result in the step ST5 is YES. A step  
ST6 discriminates whether or not the telephone call  
is ended when the discrimination result in the step  
20 ST5 is NO. The end of the telephone call may be  
detected in various manners such as when the user  
hangs up, a predetermined time elapses after the user  
hangs up, and the user picks up the handset 21 after  
hanging up.

25 When the discrimination result in the step

1 ST6 becomes YES, a step ST7 discriminates whether or  
not the name (key word) of the destination subscriber  
having the telephone number dialed in the step ST3 is  
to be registered. For example, the dialing part 64  
5 controls the speech synthesis part 23 to output a  
guidance (or message) saying "Do you wish to register  
the name of destination subscriber (key word) ?".  
When the user responds "YES" to this message by  
pushing the register key 76, for example, the  
10 discrimination result in the step ST7 becomes YES and  
the process advances to a step ST8. On the other  
hand, when the user does not respond even after a  
predetermined time or when the cancel key 81 is  
pushed, for example, the discrimination result in the  
15 step ST7 becomes NO and the process is ended.

The step ST8 enters the key word entered by  
voice. For example, the dialing part 64 controls the  
speech synthesis part 23 to output a guidance saying  
"please enter name of destination subscriber (key  
word)", and enters the key word which is entered by  
20 the user in response to this guidance. Then, a step  
ST9 registers the key word (voice data) and the  
corresponding telephone number. In other words, the  
dialing part 64 controls the voice recognition part  
61 to produce the voice data corresponding to the key  
25

1 word, and then selects an empty descriptor 69 in the  
data storage 63 and stores the telephone number and  
the voice data on the destination subscriber into  
this empty descriptor 69.

5 The dialing part 64 of the voice-dialing  
apparatus is set to the recognition mode when the  
discrimination result in the step ST2 is YES and the  
process advances to the step ST10. The operations of  
the voice-dialing apparatus in the recognition mode,  
the delete mode and the renew mode are basically the  
same as those of the fourth embodiment described  
before, and a description thereof will be omitted.

10 According to this seventh embodiment, a  
message is outputted to seek the user's instruction  
on whether or not to register a telephone number when  
this telephone number is dialed manually from the  
keyboard 30 and is not yet registered in the data  
storage 63. Hence, after each telephone call is made  
by dialing from the keyboard 30, the user simply  
needs to confirm the need for registration in order  
to register the telephone number which is not yet  
registered, and the burden on the user in registering  
the telephone numbers is considerably reduced  
compared to the case where all of the telephone  
25 numbers to be registered are registered at one time.

1 Furthermore, since the voice-dialing apparatus  
automatically checks whether or not the manually  
dialed telephone number is already registered, it is  
possible to positively prevent the same telephone  
number from being registered a plurality of times and  
thus most efficiently utilize the limited storage  
capacity of the data storage 63.

5 Next, a description will be given of an  
eighth embodiment of the voice-dialing apparatus  
according to the present invention, by referring to  
FIG.19. The voice-dialing apparatus has the handset  
21 including a microphone 21a and a speaker 21b, a  
voice response part 93, a control part 94, an adder  
95, a voice recognition part 96, and a switching part  
97. The voice response part 93 has a voice response  
control part 93a, a memory 93b for response, and a  
memory 93c for answering phone. The switch part 97  
has a voice dial switch 97a, a register switch 97b,  
and a search/playback switch 97c. The handset 21 may  
be made up of parts other than the microphone 21a and  
the speaker 21b as long as equivalent functions are  
obtainable.

10 The voice response part 93 prestores the  
voice data for guidance and the names of the  
destination subscribers in the memory 93b in a

apparatus. When making the voice-dialing, the voice dial switch 97a is turned ON and the voice-dialing is made by entering the key word by voice. The registration and search of the telephone number and key word may be made by turning ON the respective switches 97b and 97c of the switch part 97.

Table

Mode	Voice Dialing	Answering Phone	Manual Dialing
SW 97a	ON	OFF	OFF
SW 97b	ON/OFF	ON/OFF	OFF
SW 97c	OFF/ON	OFF/ON	OFF

Next, a description will be given of the operation of this eighth embodiment in the answering phone mode. The answering phone mode is selected by turning OFF the voice dial switch 97a and turning ON the register switch 97b. When a telephone call is received from an arbitrary subscriber, an instruction from the control part 94 is supplied to the voice response part 93 so as to output a guidance for answering phone, and this guidance is transmitted to the arbitrary subscriber through the control part 94 and the line. Then, a signal (for example, a beep) requesting the caller to leave a message is

digitized form, and the voice data is converted into a corresponding audio signal in the voice response control part 93a based on an instruction from the control part 94 and this audio signal is supplied to the adder 95. The adder adds the audio signal from the response part 93 and the audio signal from the destination subscriber received through the line and the control part 94, and supplies an added signal to the speaker 21b of the handset 21. The control part 94 carries out control such as the control of the dialing, the control of the registration, search, deletion and the like of the telephone numbers and key words for enabling the voice-dialing, and the control of the answering phone. The voice recognition part 96 stores the names (key words) of the destination subscribers in the form of a dictionary, and recognizes the key word of the destination subscriber by comparing the key word entered from the microphone 21a and the registered key words. The result of the recognition is supplied to the control part 94. The voice recognition part 96 may use any kind of recognition methods.

The following Table shows the relationship between the states of the switches 97a through 97c of the switch part 97 and the mode of the voice-dialing

1 transmitted on the line from the control part 94 and  
the voice response part 93 assumes a recording mode.  
In the recording mode, the message of the caller is  
digitized and stored in the memory 93c. An arbitrary  
digitizing method may be used, and for example, it is  
possible to employ a waveform compression system such  
as the ADPCM. The search/playback switch 97c is  
turned on when playing back the recorded message.  
The voice data stored in the memory 93c is supplied  
to the voice response control part 93a and is  
converted into an audio signal which is supplied to  
the speaker 21b through the adder 95.

When making the dialing manually, all of  
the switches 97a through 97c are turned OFF.

15 According to this embodiment, the voice  
response part 93 is used in common for the  
voice-dialing and for the answering phone, and only  
the memory 93c is additionally required to realize  
the answering phone function because the control of  
the voice-dialing and the control of the answering  
phone can be carried out by the same control part.  
The control of the voice response part 93 may be  
carried out solely by hardware, solely by software,  
or a combination of hardware and software. In  
addition, although the switches 97a through 97c are

1 provided, the corresponding instructions may be made  
by voice by registering such voice instructions in  
the voice response part 93. By making it possible to  
enter the instructions from either one of the  
keyboard or the handset, it becomes easier to cope  
with the initial registration of data and incorrect  
recognition made by the voice recognition part 96.

Next, a description will be given of a  
ninth embodiment of the voice-dialing apparatus  
according to the present invention, by referring to  
FIG. 20. In FIG. 20, those parts which are essentially  
the same as those corresponding parts in FIG. 2 are  
designated by the same reference numerals, and a  
description thereof will be omitted. In this  
embodiment, the standard patterns and telephone  
numbers are stored in a first external storage which  
is detachable to the voice-dialing apparatus, and the  
messages of the answering phone are stored in a  
second external storage which is also detachable to  
the voice-dialing apparatus. Hence, when the first  
external storage is attached to the voice-dialing  
apparatus, it is possible to utilize the  
voice-dialing by use of the standard patterns and  
telephone numbers stored therein. On the other hand,  
when the second external storage is attached to the

1 voice-dialing apparatus, it is possible to utilize  
the answering phone by use of the messages stored  
therein.

The voice-dialing apparatus has a connector  
5 101 which functions as an interface, and either one  
of first and second external storages 102 and 103 can  
be attached to the voice-dialing apparatus through  
the connector 101. The first external storage 102  
has a standard pattern storage 102a and a telephone  
10 number storage 102c, while the second external  
storage 102 is for storing the messages related to  
the answering phone. The first and second external  
storages 102 and 103 respectively store first and  
second identification codes for identification  
15 thereof.

Firstly, in the case where the first  
external storage 102 is attached to the voice-dialing  
apparatus through the connector 101, the control part  
29 reads the first identification code stored in the  
20 first external storage 102 and sets the mode to the  
voice-dialing mode. The operation of the  
voice-dialing apparatus in the voice-dialing mode has  
already been described heretofore, and the  
description thereof will not be repeated. When  
25 compared with the first embodiment, for example, the

standard pattern storage 102a corresponds to the  
storages 25 and 26 and the telephone number storage  
102b corresponds to the telephone number storage 28  
shown in FIG. 2.

Secondly, in the case where the second  
external storage 103 is attached to the voice-dialing  
apparatus through the connector 101, the control part  
29 reads the second identification code stored in the  
second external storage 103 and sets the mode to the  
answering phone mode. When a telephone call is  
received from an arbitrary subscriber in this  
answering phone mode, the control part 29 controls  
the voice output part 23 to read and output the  
message registered in the second external storage 103  
on the line. After outputting the message, the  
voice-dialing apparatus waits for a message to be  
entered by the caller and stores the message from the  
caller in the second external storage 103 through the  
feature extraction part 22 which extracts the feature  
quantity of the message.

FIG. 21 shows a flow chart for explaining  
the operation of the control part 29 of the ninth  
embodiment. A step S11 discriminates whether or not  
the identification code read from the external  
storage connected to the connector 101 is the first



1 identification code. When the discrimination result  
in the step ST11 is YES, a step ST12 sets the mode to  
the normal mode in which the voice-dialing can be  
made. On the other hand, when the discrimination  
5 result in the step ST11 is NO, a step ST13  
discriminates whether or not the identification code  
read from the external storage connected to the  
connector 101 is the second identification code.  
When the discrimination result in the step ST13 is  
10 YES, a step ST14 sets the mode to the answering phone  
mode. The process returns to the step ST11 when the  
discrimination result in the step ST13 is NO.

According to this embodiment, the burden on  
the user to switch the mode of the voice-dialing  
15 apparatus to the answering phone mode is extremely  
small since the user simply needs to connect the  
second external storage 103 to the connector 101. In  
addition, the storage capacities of the first and  
second external storages 102 and 103 may be set  
20 depending on the needs of the user, and the  
flexibility of the voice-dialing apparatus is  
improved compared to the conventional apparatus.

Next, a description will be given of a  
tenth embodiment of the voice-dialing apparatus  
25 according to the present invention, by referring to

1 FIG.22. In FIG.22, those parts which are essentially  
the same as those corresponding parts in FIG.2 are  
designated by the same reference numerals, and a  
description thereof will be omitted. In this  
5 embodiment, there are provided a message storage 111  
for storing the messages related to the answering  
phone and a set part 112 for setting the mode of the  
voice-dialing apparatus to a normal mode or the  
answering phone mode. The feature extraction part 22  
10 and the voice output part 23 which are used in the  
voice-dialing mode are used in common in the  
answering phone mode for storing and playing back the  
messages.

The set part 112 in this embodiment is  
15 constituted by a switch which sets the mode to the  
normal mode in a first position and to the answering  
phone mode in a second position. When the switch of  
the set part 112 is in the first position, the mode  
is set to the normal mode and it is possible to make  
20 the voice-dialing. On the other hand, when the  
switch of the set part 112 is in the second position,  
the mode is set to the answering phone mode.

FIG.23 shows a flow chart for explaining  
the operation of the control part 29 of the tenth  
25 embodiment. A step ST21 discriminates whether or not

1 the switch of the setting part 112 is in the first position. When the discrimination result in the step ST21 is YES, a step ST22 sets the mode to the normal mode in which the voice-dialing can be made. But  
5 when the discrimination result in the step ST21 is NO, a step ST23 sets the mode to the answering phone mode.

According to this embodiment, the feature extraction part 22 and the voice output part 23 are used efficiently in the normal mode and the answering phone mode, thereby avoiding the construction of the voice-dialing apparatus from becoming complex.

Next, a description will be given of an eleventh embodiment of the voice-dialing apparatus according to the present invention, by referring to FIG.24. In FIG.24, those parts which are essentially the same as those corresponding parts in FIGS.20 and 22 are designated by the same reference numerals, and a description thereof will be omitted. In this

20 embodiment, a detector 114 is provided to detect whether or not a detachable external storage 115 is attached to the connector 101. The external storage 115 has a pattern storage 102a1 for storing standard patterns for recognition, a pattern storage 102a2 for storing standard patterns for response, and the

25

1 telephone number storage 102b. When the detector 114 detects that the external storage 115 is not attached to the connector 101, the control part 29 automatically sets the mode to the answering phone mode. On the other hand, when the detector 114  
5 detects that the external storage 115 is attached to the connector 101, the control part 29 automatically sets the mode to the normal mode so that the voice-dialing can be made.

10 When the user wishes to set the mode of the voice-dialing apparatus to the answering phone mode, the user disconnects the external storage 115 from the connector 101. The disconnected external storage 115 may be connected to the connector 101 of another voice-dialing apparatus when the user wishes to utilize the voice-dialing function. When the user disconnects the external storage 115 from the connector 101, the disconnection is detected by the detector 114 and the mode is automatically set to the answering phone mode. Therefore, according to this embodiment, the burden on the user is extremely small when the user wishes to select the answering phone mode.

FIG.25 is a flow chart for explaining the operation of the control part 29 of the eleventh

25

1 embodiment. A step ST31 discriminates whether or not  
the detector 114 has detected that the external  
storage 115 is connected to the connector 101. When  
the discrimination result in the step ST31 is YES, a  
step ST32 sets the mode to the normal mode in which  
the voice-dialing can be made. On the other hand,  
when the discrimination result in the step ST31 is  
NO, that is, when the detector 114 has detected that  
no external storage is connected to the connector  
101, a step ST33 sets the mode to the answering phone  
mode.

Next, a description will be given of a  
twelfth embodiment of the voice-dialing apparatus  
according to the present invention. Since the block  
system of the fifth embodiment may also be used in  
this embodiment, the description will be given with  
reference to FIG.15. In this embodiment, a standard  
pattern for recognition of a re-dial instruction is  
registered in the pattern storage 25 in advance.

Since the last dialed telephone number is stored in  
the telephone number storage 90, the user can  
instruct by voice to re-dial the last dialed  
telephone number. In other words, when a guidance  
seeks the user's instruction, the user may instruct  
by voice and say "re-dial" to instruct the re-dialing

1 of the last dialed telephone number. According to  
this embodiment, it is possible to re-dial the last  
dialed telephone number with ease, and there is no  
need to provide a key exclusively for instructing the  
re-dialing.

However, according to the twelfth  
embodiment, there is a need to register the standard  
pattern of the re-dial instruction in advance.  
Hence, a description will now be given of a  
thirteenth embodiment of the voice-dialing apparatus  
according to the present invention in which the  
burden on the user may be reduced.

FIG.26 shows the thirteenth embodiment of  
the voice-dialing apparatus according to the present  
invention. In FIG.26, those parts which are  
essentially the same as those corresponding parts in  
FIG.15 are designated by the same reference numerals,  
and a description thereof will be omitted. In this  
embodiment, a pattern storage 121 prestores the  
standard pattern of at least one instruction related  
to the last dialed telephone number stored in the  
telephone number storage 90. For convenience sake,  
it is assumed that the standard pattern of "re-dial"  
is prestored in the pattern storage 121. Hence, in  
this embodiment, there is no need for the user to

1 register the standard pattern for the instruction  
"re-dial", and the user can instruct the re-dialing  
by simply saying "re-dial".  
5 According to the twelfth and thirteenth  
embodiments, however, the user may mistake the last  
dialed telephone number. In this case, a telephone  
number not intended by the user is re-dialed without  
being confirmed by the user. Thus, a description  
will now be given of a fourteenth embodiment of the  
10 voice-dialing apparatus according to the present  
invention in which this problem may be eliminated.

FIG. 27 shows a fourteenth embodiment of the  
voice-dialing apparatus according to the present  
invention. In FIG. 27, those parts which are the same  
15 as those corresponding parts in FIG. 26 are designated  
by the same reference numerals, and a description  
thereof will be omitted. In this embodiment, a  
telephone number search part 123 is provided to  
search at the time of the re-dialing whether or not  
20 the last dialed telephone number stored in the  
telephone number storage 90 is already registered in  
the telephone number storage 28. When the telephone  
number search part 123 detects that the last dialed  
telephone number is registered in the telephone  
25 number storage 28, the corresponding standard pattern

1 for response is read out from the pattern storage 26  
and the name (key word) of the destination subscriber  
having the last dialed telephone number is outputted  
by voice through the voice output part 23 and the  
5 handset 21. Therefore, it is possible for the user  
to confirm the last dialed telephone number before  
the re-dialing is actually made.

Although illustration and description of  
such will be omitted, it is possible to provide only  
10 one of the pattern storage part 121 and the telephone  
number search part 123 depending on the needs of the  
user.

Next, a description will be given of a  
fifteenth embodiment of the voice-dialing apparatus  
15 according to the present invention, by referring to  
FIG. 28. In FIG. 28, those parts which are essentially  
the same as those corresponding parts in FIG. 7 are  
designated by the same reference numerals, and a  
description thereof will be omitted. In this  
20 embodiment, the timer 58 times a predetermined time  
when the recognition result is outputted to the user  
for confirmation when making the voice-dialing. When  
the user does not enter any instruction during this  
predetermined time and the timer 58 supplies to the  
25 control part 29 a signal indicating that the

1 predetermined time has elapsed, the control part 29  
controls the dial circuit 27 so as to automatically  
start the dialing based on the recognized result.  
For this reason, there is no need for the user to  
5 anything when the recognition result is correct.

On the other hand, when the recognition  
result is incorrect, the user cancels the  
voice-dialing from the keyboard 30 or by hanging up,  
for example, within the predetermined time timed by  
10 the timer 58. When the cancel instruction is  
received, the control part 29 stops the timing  
operation of the timer 58 and stops the dialing.

In the embodiments described heretofore,  
various guidances are outputted to guide the user in  
15 using the voice-dialing apparatus. However, it is  
not essential that such guidances are outputted. For  
example, such guidances may be written on a user's  
manual.

In addition, the figures for convenience  
20 sake illustrate only the essential parts of the  
embodiments, and those parts which are not  
illustrated in one figure may be readily understood  
from another figure. In other words, the figures  
showing the block systems only illustrate those parts  
25 essential to describe the characterizing features of

1 each embodiment.

Further, the present invention is not  
limited to these embodiments, but various variations  
and modifications may be made without departing from  
5 the scope of the present invention.

1 WHAT WE CLAIM IS:

5 1. A voice actuated dialing apparatus comprising:  
input/output means for inputting and outputting data;  
10 feature extraction means for extracting a feature of an input data received through said input/output means;  
storage means for storing standard patterns and corresponding telephone numbers of destination  
15 subscribers as registered data;

pattern matching means for comparing a standard pattern of the feature extracted by said feature extraction means with the standard patterns stored in said storage means so as to recognize a predetermined  
20 one of the stored standard patterns which matches the standard pattern of the extracted feature;  
speech synthesis means for outputting through said input/output means a speech corresponding to said predetermined stored standard pattern read out  
25 from said storage means so as to confirm a result of

1 the recognition made in said pattern matching means;  
dialing means for dialing to a predetermined one of the telephone numbers stored in said storage part and corresponding to said predetermined standard  
5 pattern in a voice-dialing mode; and

control means for controlling operation sequences of said feature extraction means, said storage means, said pattern matching means, said speech synthesis means and said dialing means,  
10 said control means successively outputting to said input/output means at least a part of the registered data stored in said storage means in response to a search instruction received from said input/output means designating the part to be  
15 successively outputted.

20 2. A voice actuated dialing apparatus as claimed in claim 1 in which said input/output means has a handset, a keyboard and a display part.

1 3. A voice actuated dialing apparatus as  
claimed in claim 2 in which said control means  
successively outputs to said input/output means at  
least a part of the registered data stored in said  
5 storage means in a predetermined sequence in response  
to said search instruction received from said  
input/output means.

10 4. A voice actuated dialing apparatus as  
claimed in claim 3 in which said control means  
successively outputs to said handset through said  
15 speech synthesis means at least a part of the  
registered data stored in said storage means in a  
predetermined sequence in response to said search  
instruction received from said input/output means.

20 5. A voice actuated dialing apparatus as  
claimed in claim 2 in which at least said  
25 predetermined standard pattern is outputted to said

1 handset through said speech synthesis means in the  
voice-dialing mode, said control means controlling  
said dialing means to dial said predetermined  
telephone number only when a confirmation confirming  
5 a correct recognition by said pattern matching means  
is received from said input/output means.

10 6. A voice actuated dialing apparatus as  
claimed in claim 2 in which at least said  
predetermined standard pattern is outputted to said  
handset through said speech synthesis means in the  
15 voice-dialing mode, said control means controlling  
said dialing means to dial said predetermined  
telephone number when no instruction is received from  
said input/output means within a predetermined time  
from a time when said predetermined standard pattern  
20 is outputted to said handset.

25 7. A voice actuated dialing apparatus as

1 claimed in claim 1 in which at least a certain  
standard pattern out of the standard patterns  
successively outputted in the search mode is  
designated by a designation received from said  
5 input/output means, said dialing means dialing to one  
of the telephone numbers corresponding to said  
certain standard pattern.

10

8. A voice actuated dialing apparatus as  
claimed in claim 7 in which said control means  
successively outputs to said input/output means at  
15 least a part of the registered data stored in said  
storage means in response to a search instruction  
received from said input/output means designating the  
part to be successively outputted.

20

9. A voice actuated dialing apparatus as  
claimed in claim 1 in which said control means stores  
25 in said storage means a frequency with which each

1 telephone number is used, and said control means  
successively outputs to said input/output means at  
least a part of the registered data stored in said  
storage means in response to a search instruction  
5 received from said input/output means designating the  
part to be successively outputted as having a  
predetermined frequency of use.

10

10. A voice actuated dialing apparatus as  
claimed in claim 1 in which said control means stores  
in said storage means a recognition rate of each  
15 destination subscriber, and said control means  
successively outputs to said input/output means at  
least a part of the registered data stored in said  
storage means in response to a search instruction  
received from said input/output means designating the  
20 part to be successively outputted as having a  
predetermined recognition rate.

25



1 11. A voice actuated dialing apparatus as  
2 claimed in claim 1 in which said pattern matching  
3 means has a preliminary selection part and a main  
4 selection part, said preliminary selection part in  
5 response to the search instruction comparing a  
6 certain portion of the standard pattern of the  
7 feature extracted by said feature extraction means  
8 with corresponding portions of the standard patterns  
9 stored in said storage means when the search  
10 instruction accompanies a subject of search so as to  
11 select specific standard patterns having a certain  
12 similarity to said certain portion, said main  
13 selection part comparing the standard pattern of the  
14 feature extracted by said feature extraction means  
15 with only said specific standard patterns so as to  
16 recognize the predetermined one of the specific  
17 standard patterns which matches the standard pattern  
18 of the extracted feature.

20  
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25 12. A voice actuated dialing apparatus as  
26 claimed in claim 11 in which said control means  
27 successively outputs to said input/output means only

1 the specific standard patterns selected by said  
2 preliminary selection part in response to a search  
3 instruction received from said input/output means  
4 designating a part of the registered data to be  
5 successively outputted.

10 13. A voice actuated dialing apparatus as  
11 claimed in claim 12 in which said specific standard  
12 patterns are successively outputted to said  
13 input/output means in a sequence dependent on a  
14 similarity to the standard pattern of the feature  
15 extracted by said feature extraction means.

20 14. A voice actuated dialing apparatus  
21 comprising:  
22 input/output means for inputting and outputting  
23 data;  
24 feature extraction means for extracting a  
25 feature of an input data received through said

1 input/output means;

storage means for storing standard patterns and  
corresponding telephone numbers of destination  
subscribers as registered data, said storage means  
5 storing a plurality of telephone numbers with respect  
to predetermined ones of the subscribers;

pattern matching means for comparing a standard  
pattern of the feature extracted by said feature  
extraction means with the standard patterns stored in  
10 said storage means so as to recognize a predetermined  
one of the stored standard patterns which matches the  
standard pattern of the extracted feature;

speech synthesis means for outputting through  
said input/output means a speech corresponding to  
15 said predetermined stored standard pattern read out  
from said storage means so as to confirm a result of  
the recognition made in said pattern matching means;  
dialing means for dialing to a predetermined one  
of the telephone numbers stored in said storage part  
20 and corresponding to said predetermined standard  
pattern in a voice-dialing mode; and

control means for controlling operation  
sequences of said feature extraction means, said  
storage means, said pattern matching means, said  
25 speech synthesis means and said dialing means,

1 said control means controlling said dialing  
means to automatically dial another telephone number  
which corresponds to said predetermined standard  
pattern in a voice-dialing mode when a line of a  
5 first dialed telephone number is busy and a plurality  
of telephone numbers are stored with respect to said  
predetermined standard pattern.

15. A voice actuated dialing apparatus as  
claimed in claim 14 in which said control means  
controls said dialing means to automatically dial  
15 another telephone number which corresponds to said  
predetermined standard pattern until a connection  
to non-busy line is made.

16. A voice actuated dialing apparatus as  
claimed in claim 14 in which said control means  
stores in said storage means a frequency with which  
25 each telephone number is used, and said control means

1 controls said dialing means to automatically dial  
another telephone number which corresponds to said  
predetermined standard pattern by selecting said  
other telephone number in a sequence dependent on the  
5 frequency of use.

10 17. A voice actuated dialing apparatus  
comprising:

input/output means for inputting and outputting  
data;

feature extraction means for extracting a

15 feature of an input data received through said

input/output means;

storage means for storing standard patterns and

corresponding telephone numbers of destination

subscribers as registered data and for storing a last

20 dialed telephone number;

pattern matching means for comparing a standard

pattern of the feature extracted by said feature

extraction means with the standard patterns stored in

said storage means so as to recognize a predetermined

25 one of the stored standard patterns which matches the

1 standard pattern of the extracted feature;

speech synthesis means for outputting through

said input/output means a speech corresponding to

said predetermined stored standard pattern read out

5 from said storage means so as to confirm a result of

the recognition made in said pattern matching means;

dialing means for dialing to a predetermined one

of the telephone numbers stored in said storage part

and corresponding to said predetermined standard

10 pattern in a voice-dialing mode; and

control means for controlling operation

sequences of said feature extraction means, said

storage means, said pattern matching means, said

speech synthesis means and said dialing means,

15 said control means controlling said storage

means to store said last dialed telephone number in

said storage means as registered data in response to

a register instruction received from said

input/output means, said register instruction

20 accompanying a standard pattern which corresponds to

said last dialed telephone number and is entered from

said input/output means through said feature

25 extraction means.

1 18. A voice actuated dialing apparatus  
comprising:  
input/output means for inputting and outputting  
data;  
5 feature extraction means for extracting a  
feature of an input data received through said  
input/output means;  
storage means for storing standard patterns and  
corresponding telephone numbers of destination  
10 subscribers as registered data;  
pattern matching means for comparing a standard  
pattern of the feature extracted by said feature  
extraction means with the standard patterns stored in  
said storage means so as to recognize a predetermined  
15 one of the stored standard patterns which matches the  
standard pattern of the extracted feature;  
speech synthesis means for outputting through  
said input/output means a speech corresponding to  
said predetermined stored standard pattern read out  
20 from said storage means so as to confirm a result of  
the recognition made in said pattern matching means;  
dialing means for dialing to a predetermined one  
of the telephone numbers stored in said storage part  
and corresponding to said predetermined standard  
25 pattern in a voice-dialing mode;

1 area code editing means for editing an area code  
of the telephone numbers stored in said storage  
means; and  
control means for controlling operation  
5 sequences of said feature extraction means, said  
storage means, said pattern matching means, said  
speech synthesis means, said dialing means and said  
area code editing means,  
said control means controlling said area code  
10 editing means to delete and/or renew at least an area  
code of a specific telephone number stored in said  
storage means in response to an edit instruction  
received from said input/output means.  
15  
19. A voice actuated dialing apparatus as  
claimed in claim 18 in which said control means  
20 controls said area code editing means to delete the  
area code from all of the stored telephone numbers  
having a predetermined area code in response to an  
edit instruction instructing a deletion of said  
predetermined area code.

1 20. A voice actuated dialing apparatus as  
1 claimed in claim 18 in which said control means  
controls said area code editing means to renew the  
5 area code of all of the stored telephone numbers  
having a predetermined area code in response to an  
edit instruction instructing a renewal of said  
predetermined area code.

10  
21. A voice actuated dialing apparatus as  
claimed in claim 18 in which said control means  
controls said area code editing means to add the area  
15 code to all of the stored telephone numbers having no  
area code in response to an edit instruction  
instructing a renewal of the telephone numbers having  
no area code.

20  
22. A voice actuated dialing apparatus  
comprising:  
25 input/output means for inputting and outputting

1 data;  
1 feature extraction means for extracting a  
feature of an input data received through said  
5 input/output means;  
storage means for storing standard patterns and  
corresponding telephone numbers of destination  
subscribers as registered data and for storing a last  
dialed telephone number;

10 pattern matching means for comparing a standard  
pattern of the feature extracted by said feature  
extraction means with the standard patterns stored in  
said storage means so as to recognize a predetermined  
15 one of the stored standard patterns which matches the  
standard pattern of the extracted feature;

20 speech synthesis means for outputting through  
said input/output means a speech corresponding to  
said predetermined stored standard pattern read out  
from said storage means so as to confirm a result of  
the recognition made in said pattern matching means;  
25 dialing means for dialing to a predetermined one  
of the telephone numbers stored in said storage part  
and corresponding to said predetermined standard  
pattern in a voice-dialing mode; and  
control means for controlling operation  
sequences of said feature extraction means, said

1 storage means, said pattern matching means, said  
speech synthesis means and said dialing means,  
said control means having means for detecting  
whether or not said last dialed telephone number is  
5 already stored in said storage means as registered  
data.

10

23. A voice actuated dialing apparatus as  
claimed in claim 22 in which said control means  
controls said storage means to store said last dialed  
telephone number in said storage means as registered  
15 data in response to a register instruction received  
from said input/output means only when said last  
dialed telephone number is not stored in said storage  
means as registered data as a result of the  
detection, said register instruction accompanying a  
20 standard pattern which corresponds to said last  
dialed telephone number and is entered from said  
input/output means through said feature extraction  
means.

25

24. A voice actuated dialing apparatus as  
claimed in claim 22 in which said control means has  
means for outputting a guidance to said input/output  
means to seek a register instruction which instructs  
5 said last dialed telephone number to be registered as  
registered data only when said last dialed telephone  
number is not stored in said storage means as  
registered data as a result of the detection.

10

25. A voice actuated dialing apparatus  
comprising:  
15 input/output means for inputting and outputting  
data;  
feature extraction means for extracting a  
feature of an input data received through said  
input/output means;  
20 storage means for storing standard patterns and  
corresponding telephone numbers of destination  
subscribers as registered data and for storing  
messages related to an answering phone mode;  
25 pattern matching means for comparing a standard

1 pattern of the feature extracted by said feature  
 1 extraction means with the standard patterns stored in  
 said storage means so as to recognize a predetermined  
 one of the stored standard patterns which matches the  
 standard pattern of the extracted feature;  
 5 speech synthesis means for outputting through  
 said input/output means a speech corresponding to  
 said predetermined stored standard pattern read out  
 from said storage means so as to confirm a result of  
 the recognition made in said pattern matching means;  
 10 dialing means for dialing to a predetermined one  
 of the telephone numbers stored in said storage part  
 and corresponding to said predetermined standard  
 pattern in a voice-dialing mode; and  
 15 control means for controlling operation  
 sequences of said feature extraction means, said  
 storage means, said pattern matching means, said  
 speech synthesis means and said dialing means,  
 said control means using said storage means and  
 20 said speech synthesis means in common during the  
 voice-dialing mode and the answering phone mode.

25

1 26. A voice actuated dialing apparatus as  
 claimed in claim 25 which further comprises setting  
 means for setting a mode of said voice actuated  
 dialing apparatus to one of said voice-dialing and  
 5 answering phone modes.

10 27. A voice actuated dialing apparatus  
 comprising:  
 input/output means for inputting and outputting  
 data;  
 15 feature extraction means for extracting a  
 feature of an input data received through said  
 input/output means;  
 first storage means for storing standard  
 patterns and corresponding telephone numbers of  
 destination subscribers as registered data;  
 20 second storage means for storing messages  
 related to an answering phone mode;  
 pattern matching means for comparing a standard  
 pattern of the feature extracted by said feature  
 extraction means with the standard patterns stored in  
 25 said first storage means so as to recognize a

1 predetermined one of the stored standard patterns

which matches the standard pattern of the extracted feature;

speech synthesis means for outputting through

5 said input/output means a speech corresponding to

said predetermined stored standard pattern read out

from said first storage means so as to confirm a

result of the recognition made in said pattern

matching means;

10 dialing means for dialing to a predetermined one

of the telephone numbers stored in said first storage

part and corresponding to said predetermined standard

pattern in a voice-dialing mode; and

control means for controlling operation

15 sequences of said feature extraction means, said

first and second storage means, said pattern matching

means, said speech synthesis means and said dialing

means,

said control means using said speech synthesis

20 means in common during the voice-dialing mode and the

answering phone mode,

at least one of said first and second storage

means being detachable with respect to said voice

actuated dialing apparatus.

25

1 28. A voice actuated dialing apparatus as

claimed in claim 27 in which said control means

automatically sets a mode of said voice actuated

dialing apparatus to one of said voice-dialing and

5 answering phone modes depending on which one of said

first and second storage means is attached to said

voice actuated dialing apparatus.

10

29. A voice actuated dialing apparatus as

claimed in claim 27 in which both said first and

second storage means are detachable with respect to

15 said voice actuated dialing apparatus, and said voice

actuated dialing apparatus further comprises means

for identifying which one of said first and second

storage means is attached to said voice actuated

dialing apparatus, said control means automatically

20 setting a mode of said voice actuated dialing

apparatus to one of said voice-dialing and answering

phone modes depending on a result of the

identification.

25



1 30. A voice actuated dialing apparatus as  
 5 claimed in claim 27 in which only said first storage  
 means is detachable with respect to said voice  
 actuated dialing apparatus, and said voice actuated  
 10 dialing apparatus further comprises means for  
 detecting whether or not said first storage means is  
 attached to said voice actuated dialing apparatus,  
 said control means automatically setting a mode of  
 said voice actuated dialing apparatus to said  
 15 voice-dialing mode when said first storage means is  
 attached as a result of the detection and to said  
 answering phone mode when said first storage means is  
 not attached as a result of the detection.

31. A voice actuated dialing apparatus  
 comprising:  
 20 input/output means for inputting and outputting  
 data;  
 feature extraction means for extracting a  
 feature of an input data received through said  
 input/output means;  
 25 storage means for storing standard patterns and

1 corresponding telephone numbers of destination  
 subscribers as registered data and for storing a last  
 5 dialed telephone number;

pattern matching means for comparing a standard  
 pattern of the feature extracted by said feature  
 10 extraction means with the standard patterns stored in  
 said storage means so as to recognize a predetermined  
 one of the stored standard patterns which matches the  
 standard pattern of the extracted feature;

15 speech synthesis means for outputting through  
 said input/output means a speech corresponding to  
 said predetermined stored standard pattern read out  
 from said storage means so as to confirm a result of  
 the recognition made in said pattern matching means;

20 dialing means for dialing to a predetermined one  
 of the telephone numbers stored in said storage part  
 and corresponding to said predetermined standard  
 pattern in a voice-dialing mode; and

control means for controlling operation  
 25 sequences of said feature extraction means, said  
 storage means, said pattern matching means, said  
 speech synthesis means and said dialing means,  
 said control means controlling said dialing  
 means to re-dial said last dialed telephone number  
 stored in said storage means in response to a re-dial

1 instruction.

5 32. A voice actuated dialing apparatus as  
claimed in claim 31 in which said storage means  
prestores a standard pattern of a re-dial  
instruction, said pattern matching means recognizing  
the re-dial instruction which is entered by voice  
from said input/output means so that said control  
means control said dialing means to re-dial said last  
dialed telephone number in response to the re-dial  
instruction entered by voice.

15

33. A voice actuated dialing apparatus as  
claimed in claim 31 in which said control means  
outputs said last dialed telephone number to said  
input/output means so as to control said dialing  
means to dial said predetermined telephone number  
only when a confirmation is received from said  
input/output means.

25

1 34. A voice actuated dialing apparatus as  
claimed in claim 31 in which said control means has  
means for detecting whether or not a standard pattern  
of said last dialed telephone number is stored in  
said storage means, said control means outputting the  
standard pattern of said last dialed telephone number  
to said input/output means so as to control said  
dialing means to dial said predetermined telephone  
number only when a confirmation is received from said  
input/output means.

10

35. A voice actuated dialing apparatus as  
claimed in claim 34 in which said input/output means  
has a handset, a keyboard and a display part, and  
said control means outputs the standard pattern of  
said last dialed telephone number to at least said  
handset.

20

36. A voice actuated dialing apparatus

25

1 substantially as heretofore described with  
reference to the accompanying drawings.

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